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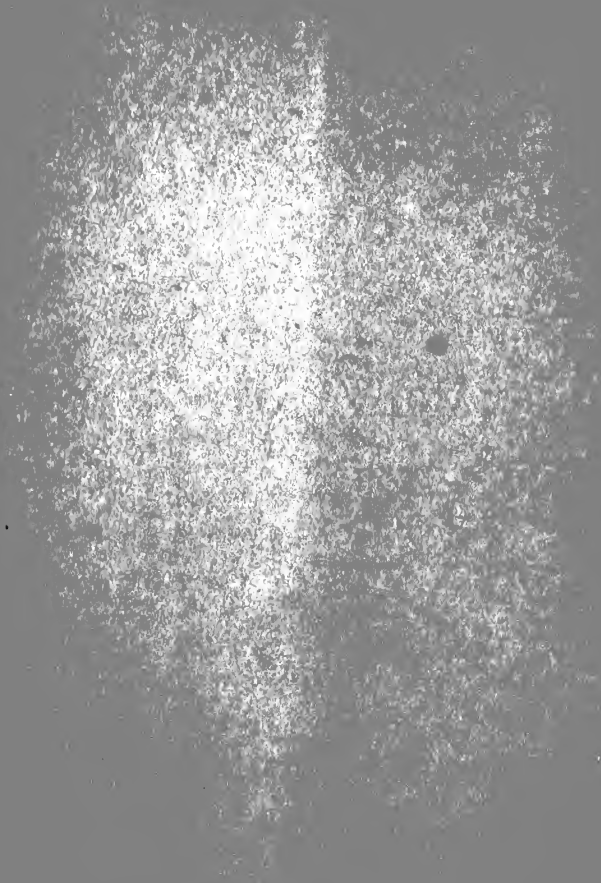
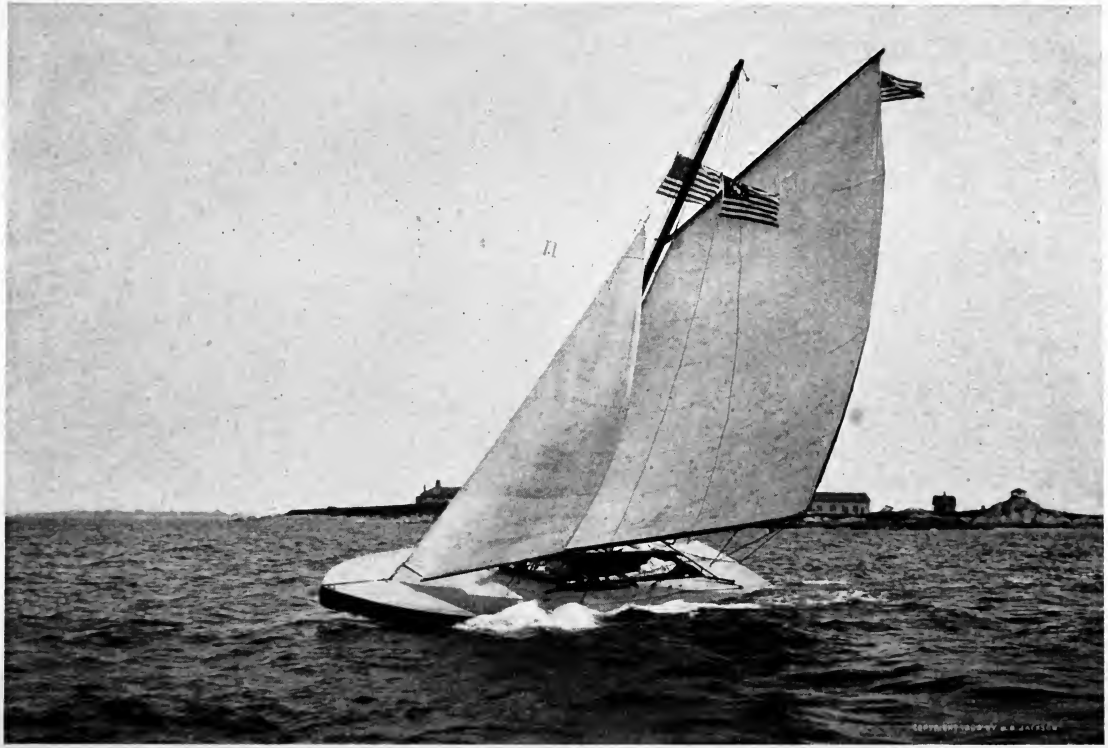
THE SMALL YACHT





"Manchester," winner International Seawanhaka Cup, 1905. A good example of the 40-foot racing machine at high speed. Note easy entrance and smooth wake

THE SMALL YACHT

ITS MANAGEMENT AND HANDLING FOR RACING AND SAILING

WITH CHAPTERS ON CONSTRUCTION

BY

EDWIN A. BOARDMAN

WITH NUMEROUS ILLUSTRATIONS FROM PHOTOGRAPHS

BOSTON
LITTLE, BROWN, AND COMPANY
1909

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Published, June, 1909.

THE UNIVERSITY PRESS, CAMBRIDGE, U. S. A.

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CLASS A XXc. No.

INTRODUCTION

IN this book I shall endeavor to tell in plain words, so that it may be read and understood by the youngest amateur interested in Small Yacht Racing, some of the best methods for tuning up a boat, or, in other words, preparing her for a race. I shall also explain the various ways and means to extricate one's boat from, and gain advantage of, a competitor or competitors. Of course, in a sport of this sort it is absolutely impossible to lay down "hard and fast" rules, as the change in conditions and positions is so very variable. But I think the general rules I shall give, in the majority of cases at least, have proven successful and are in use by the crack amateur sailors in this country.

Racing rules in America are now substan-

tially alike, so that my endeavor to explain and illustrate the matter will be of some value to all who are interested in racing yachts.

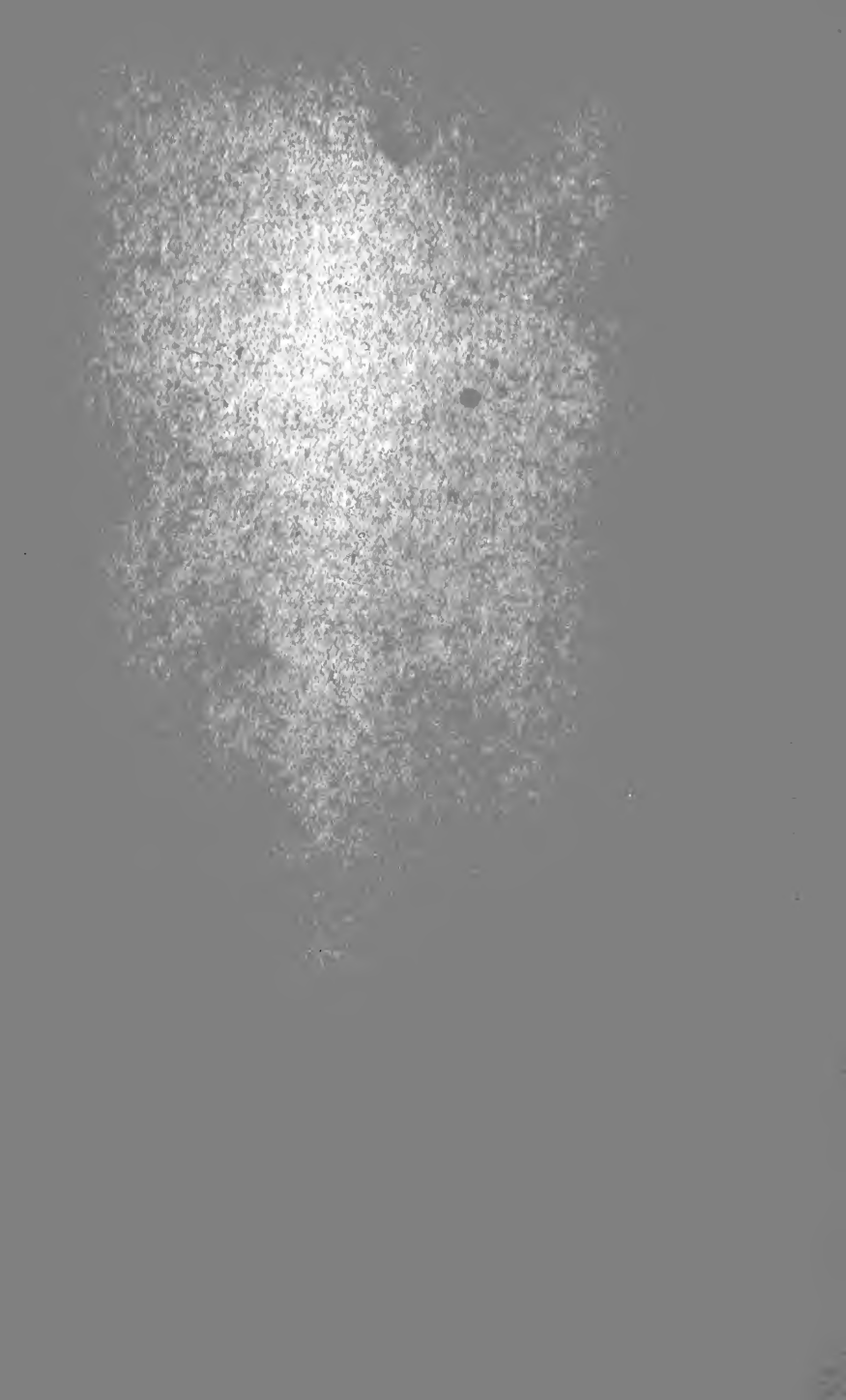
I shall keep away as much as possible from scientific terms which are only known to naval architects and professionals, and shall explain them, when the use of such terms is necessary.

I shall illustrate my points as far as I can with photographs and sketches, but it would be impossible to cover all other combinations and remedies. We all know that experience is by far the best teacher, especially in racing yachts. In some cases, the ability to handle a boat successfully is inborn, thereby making it a much more simple matter to learn and succeed.

This work is written from my own experiences, and I think is the first of the kind undertaken in this branch of sport. I sincerely hope that it will fill the gap there now seems to be, in a small way at least, in the yachting libraries of the world.

INTRODUCTION

I have divided this book into two parts, the first dealing with the preparation of the yacht for the race, and the second the sailing of the yacht during the race, this being the most convenient method. I shall use photographs, pen sketches, and plans from my office, when and where I deem it necessary, and in many instances illustrations will be able to show the point better than words.



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PART FIRST

THE SMALL YACHT

PART FIRST

CHAPTER I

GENERAL MAKEUP OF THE RACING YACHT

THE general tuning up of a racing boat (I speak of the smaller classes, and of wooden boats, not metal, as their treatment would be quite different) consists in perfecting various members that go to make up the whole and then the treatment of the yacht as a unit. We will take as an example the twenty-one foot water-line knockabout, or raceabout, the type of which is fast spreading over the entire globe.

This boat embodies five separate elements that are essential to speed: first, the design; second, the helmsman; third, the set of the sails; fourth, the condition of the surface

of the boat that comes in contact with the water; fifth, the general construction. I do not say that these are necessarily the order of importance, but they are the main features.

I will first take up the general requisites of design, and these depend on the type and class you intend to build in, also whether you will sail the majority of races in home waters or abroad. If an owner can tell an architect the general weather conditions to be met with, then the architect can design the boat accordingly, and in many cases this knowledge of conditions means success where otherwise it would be failure. For instance, if your majority of races are in Massachusetts Bay, especially at Marblehead, where the weather and wind conditions are generally light, with a long easy ground swell, the type of model which has proven itself to be superior is the round, easy form, easy in movement and quick to get headway in the light conditions.

Quite opposite to these conditions of wind

With sheets slightly lifted, showing smooth wake from starboard quarter

Racing scow at Manchester, showing greatly increased water line length even in light wind

A start of the 18-foot knockabout class in Massachusetts Bay, showing boats to windward outpointing those to leeward, and the possibility of lacing these boats down

and water are those of Kiel, Germany, or those of the South Shore of Massachusetts and Connecticut, more especially perhaps Buzzards Bay in Massachusetts. I mention these localities merely as examples, so that I may better show the different conditions to be provided for.

The prevailing wind on the South Shore is the strong, smoky southwester, and this, with the strong current in Long Island Sound, stirs up a very heavy, short, quick sea. With the shoal depth of water in Buzzards Bay, the effect is the same.

The boats that seem to be best suited to these conditions are the wide, powerful centerboards, with large flat bottoms, giving a very large initial stability and showing great power to stand up and sail.

I will give here two illustrations of the "centerboard" and "keel" types, pitted against each other under the different conditions just mentioned.

A "centerboard" boat came to Marble-

head and raced a fleet of "keel" boats, being badly worsted by seventy per cent of the fleet. Another year the crack "keel" went to Buzzards Bay, and in a match race was beaten by a "centerboarder." This goes to show the general idea, but, of course, there are exceptions to the rule.

Again, this idea of design depends a great deal on the restrictions of the class in which you are going to build, as different restrictions work out in favor of one or the other type in all conditions of weather.

We will now turn to the very important factor in the success of the racing yacht, the helmsman and crew. As the racing to-day, in at least a great many classes, is among one design boats, and in a great many others practically one design (as the various sets of class restrictions limit the variance in the design), it sends the trend of naval architecture in one direction, and thus it comes down to the successful management of the yacht, broadly speaking.

In the classes in this part of the world there are always one, two, or three men who are considered to be somewhat superior to the other sailors in the fleet; this, however, should never discourage the younger men, as there is example after example of cases where, by keeping at it, they, in time, catch up and pass the older men. As beginners they have overlooked the small things that seemed in those days insignificant, but are now being carefully taken care of. Thus, as in no other sport, the details should be carefully looked after.

The set of the sails is, of course, a matter of the greatest importance, the boat's only means of propulsion being the sails, and especially in a boat sailing to windward the least pocket or flat spot in the wrong place will greatly retard her progress; more so than most people imagine, as it is a very slight moment of positive pressure that she is subjected to. This sail matter is not so important when the yacht is running free, as then it is

simply an area of cloth, held out for the wind's direct pressure.

Another point well to mention here in a general way, is the skin resistance, that is, the water touching the sides and bottom of the boat's body. Surface friction is a great detriment to a boat's headway through the water, and we are yet a long way off from a discovery of some really good coating that will satisfactorily stand against the action of salt or fresh water, while still giving the least possible resistance to the water passing by it. There are, to-day, all sorts of paints, greases, black lead, and the bare metal bronze plates of the large yachts, and it is far from being decided which is superior for a racing composition, although almost every one has his preference, and thinks his own coating infinitely superior to his rival's.

On the general construction of a small yacht depends, in a great measure, the surface you are able to obtain on the outside of the planks. A boat must be built as light as

possible, yet have a great rigidity in order to hold her form and prevent buckling and twisting as far as possible, so that the putty and seam filling placed between the planks shall not have a chance to work out and so break the outer surface, at once offering added resistance to the water as the surface becomes roughened. In the case of the deep keel boats with from two thousand to six thousand pounds of lead hung on a slight narrow fin, the chances for twist and strain are very great, especially as this lead has a great leverage, being down five to eight feet below the surface. This means, to prevent leakage, etc., that the construction must be of the very best and most carefully thought out and put together, the best of material being used, including the toughest and lightest of woods and non-corrosive metals.

I have now given, in a general way, the most necessary points that go to make up speed in yacht racing. They all overlap each other and rely on one another; all are im-

portant and cannot be too carefully worked up to perfection. I have intended this chapter to be simply a synopsis of "Part First," and will give the detailed accounts in the Chapters following.

CHAPTER II

DETAILED EXPLANATION OF DESIGN

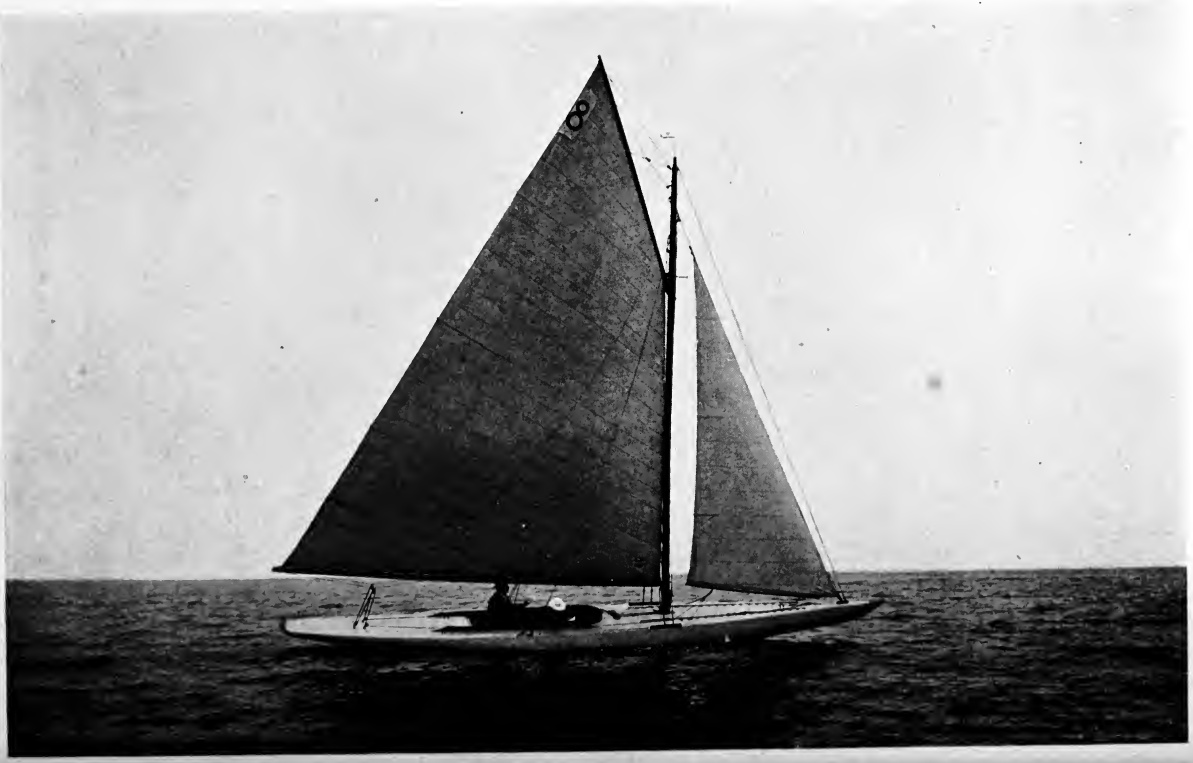
THEORY, practice, experience, actual tests, lifelong study, all based on common sense, are the requisites that help to make the successful design. As the saying goes, a yacht cannot sail faster than the slowest part of the hull can be driven. In other words, a beautiful bow, showing speed lines in every curve, accompanied by a poor stern, means that the boat as a unit cannot go faster than the stern, and thus it is the combination of bow, stern, and middle body that goes to make up the yacht as a fast sailing unit. Symmetry in design is one of the greatest factors of success, the bow must fit the stern, the rig, the body, and the centers must be in correct relationship to one another at all angles of heel to make a good all-round boat.

The centers that I mention above are the center of gravity of the lead ballast on the keel, the center of gravity of the entire craft, the center of buoyancy of the hull, the center of lateral resistance or actual plane, this being in some cases simply the center of the fin or keel in flat bottom boats, the rudder sometimes being taken into consideration, and being the center of the entire submersed body as a plane in "V" shaped bottom boats. The center of effort is the center of efficiency of the sail spread, as a plane.

Designers vary in their ideas in regard to the relationship of these centers to one another, and, of course, the relationship changes a great deal in the different types of yachts, the combination depending on the form, whether she be scow or wedge bottom.

In the scow form, the center of buoyancy quickly shifts to leeward depending upon the angle of keel, and as the yacht is water-borne practically from stem to stern on a long straight side or sailing line, she does not

Seawanhaka Cup Challenger "Manchester," showing correct sailing list at high speed and position of crew. Note windward rudder clear of the water and only slight feather from wake on leeward quarter



A high ended easy formed American Sonder Class boat. An excellent type for almost any conditions

have the tendency to twist and turn but sails straight ahead on her form and does not take hold on her rudder. In her upright position she is a flat, square plank, short on the water-line for measurement purposes, but heeled over to her proper sailing angle, she at once becomes a long, narrow cigar-shaped craft, getting the benefit of her huge overhangs, her sailing length being practically that of her over-all length.

An excellent example of boats of this sort are the great scows that recently raced for the Quincy Cup in Massachusetts Bay, their dimensions being fifty-five feet over-all, and twenty-one feet on the water-line, but their actual sailing length was fifty feet, a tremendous increase.

The Seawanhaka International Cup boats are another good example of this sort of thing. This type, forty feet over-all, twenty-five feet water-line, eight feet beam, and five inches draft, weighing twenty-five hundred pounds, without ballast except for their steel or

bronze bilge boards (which weigh about one hundred and twenty-five pounds each), are the fastest yachts of their sail spread in the world, the area being five hundred feet.

In the actual drafting of a design, the first step after you have decided on the class is a study of the restrictions under which the boat will be built, determining by these and by the previous performances of the yachts in the class what combination of dimensions will turn out the fastest boat, taking everything into consideration. This being decided upon, a brown paper sketch is drawn of the profile, deck line, and midship section. When these suit your ideas lay same down on the final drafting paper and work in the body plan.

Then comes the sail and construction plan, and cabin last of all, if there happens to be one. From the finished lines a table of offsets is taken in feet, inches, and eighths for the use of the builder in laying the boat down, full size, on the floor of the drafting loft; and

from this the builder makes his moulds for setting the boat up in the shop.

This seems simple enough, but requires an infinite amount of care and perseverance.

A few of the points necessary to be figured out are given in the following table. All of these are of actual use, some directly and some as references for future designs:

Number.....; Name.....Boston,.....190

Type.....

Built for.....by.....Contract price.....

Launched.....

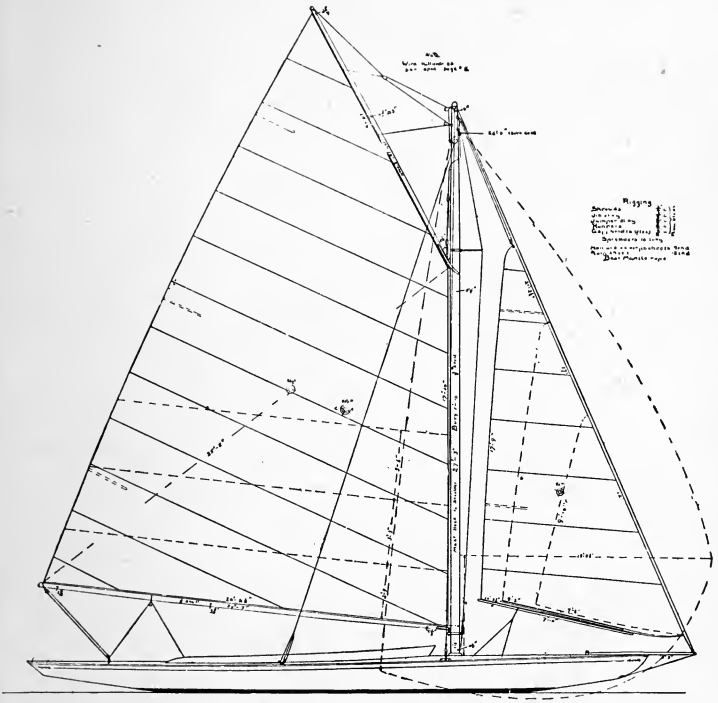
Design begun	Design finished.
Length over-all	Pounds per inch at L. W. L.
Length water-line	Pounds to alter W. L. 1 in. at L. W. L.
Overhang forward	Area lateral plane of hull.
Overhang aft	Area lateral plane below fairbody.
Beam extreme	Area centerboard.
Beam W. L.	Area rudder.
Beam transom	Total lateral plane below fairbody.
Freeboard stem	Total wetted surface.
Freeboard least	Area sails actual.
Freeboard transom . . .	Area sails rated.
Draft extreme	Ratio sail area to wetted surface.
Draft to fairbody	Ratio sail area to lateral plane.
Draft board down . . .	Ratio displacement cu. ft. to cube of L. W. L.
Area L. W. L. plane . .	Ratio displacement cu. ft. to mid-section × L. W. L.
Area amidship section . .	Ratio displacement cu. ft. to deck area × depth hull.
Maximum girth of hull .	Ratio length to beam at L. W. L.

Displacement	Ratio overhangs to L. W. L.
Outside ballast	Ratio ballast to displacement.
Inside ballast	Ratio rudder to balance lateral plane.
Total ballast	Ratio (C. B. aft W. L.) to L. W. L.
C. G. outside ballast aft of C. B.	Ratio (C. V. L. P. aft W. L.) to L. W. L.
	Ratio (C. E. to C. L. P.) to L. W. L.
	Ratio (C. E. to B. P.) to L. W. L.

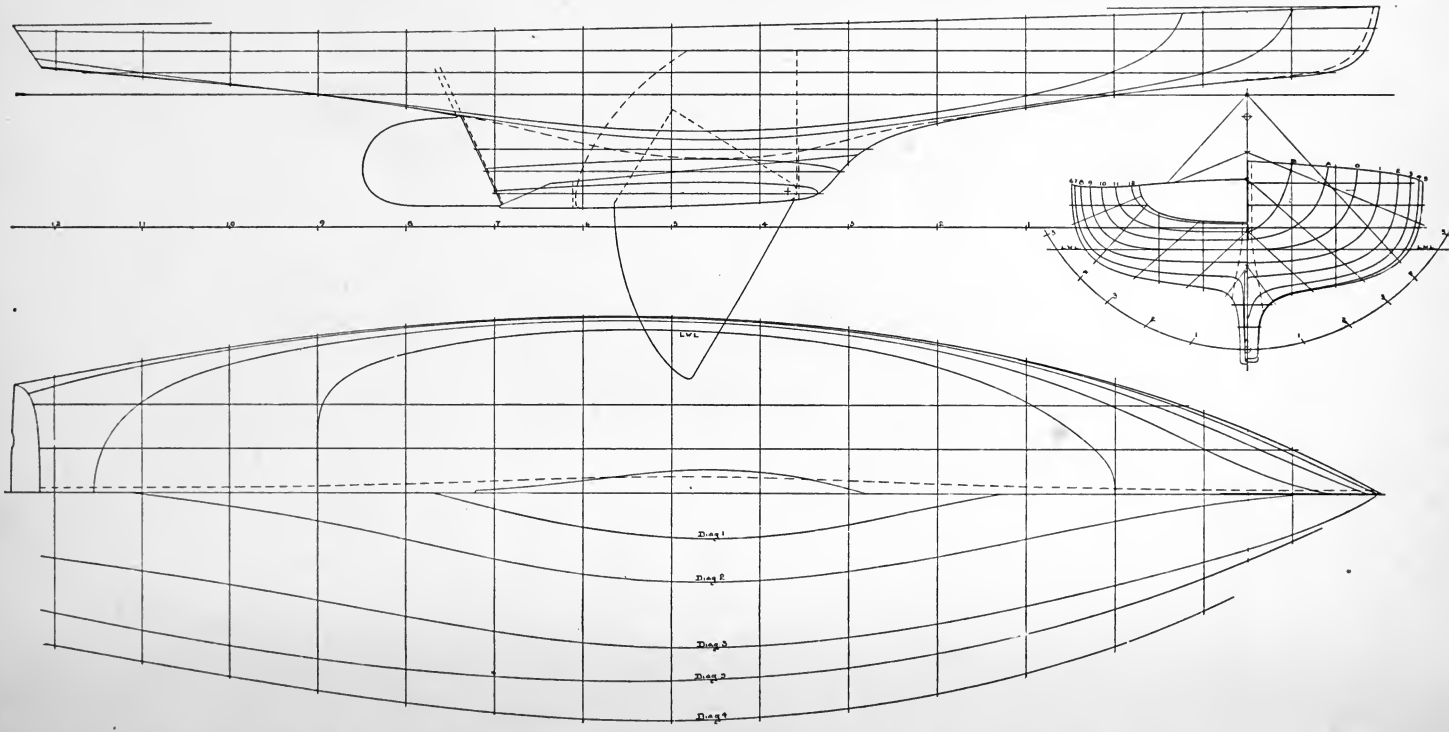
INDEX TO TABLE

L. W. L.	Load water-line.
C. G.	Center of gravity.
C. B.	Center of buoyancy.
C. V. L. P.	Center vertical lateral plane (meaning fin or keel).
C. E.	Center of effort (of sails).
C. L. P.	Center of lateral plane (meaning entire immersed body).
B. P.	Balancing point.

It was not so very long ago that the factors in the table were never thought of in the design of the small racer, and the boat was built from a wooden model whittled out of a block of wood to suit the eye of the builder, the centers, displacement, etc., being simply guessed at, and the builder trusted to luck that they would come right. But to-day instruments are used to get the different areas, etc., and the designer is much more sure of himself than under the old rule of thumb system, the weights of the wood used



DESIGN 12*c*. Sail plan of Massachusetts Bay 18-footer, having a short bowsprit and mainboom well inboard. A very satisfactory rig, well balanced, and easy to handle



Design 14. Lines of a Massachusetts Bay 18-foot centerboard boat, ballast on a shoal keel
An excellent, safe, centerboard type

in construction and the ability of the builder to follow the plans being the only real uncertainties.

In the racing knockabout of to-day we have a small boat that comes nearer being perfection for salt water purposes than any other type of small yacht in the world yet produced. This boat is first of all very safe and seaworthy, being practically non-capsizable, very easy to handle and with small sails. She moves through the water with very little resistance, either in light winds or heavy, is quick to turn, and certainly a pleasure to steer. Her wake is smooth, well ironed out, she opens the water nicely, going partially through and partially over it; the bow wave being practically spray with no heavy curl of solid water to be thrown aside; and in the bow wave there is enough lifting force, as the overhang scoops out over the surface or through a sea, to carry her head well clear and free from solid water, so different from the old style of straight-stemmed

boat that became very dangerous when being driven hard in a breeze. The deep forefoot and sharp entrance would grip the water, slue around and bury, often capsizing the yacht, and this danger has been absolutely done away with.

Another very important point in the present design is the balancing of the sails with the hull so that the boat shall steer, no matter on what angle of heel.

The center of effort of the working sails comes slightly forward of the center of the mainsail, and the placing of the mast and entire rig depends on where the center of the lateral plane is. It is necessary, in wide shoal boats, to place the center of effort well forward of the center of L. P. as the center of buoyancy quickly shifts to one side, and to make them steer properly on this heel the lead of the sails should be large, especially where the rudders are small, as for instance on the unballasted scow.

On narrow wedge bottom boats the lead is

not so great, as the center of buoyancy stays more nearly in the same place and the boat consequently is much easier to steer as the pressure on the rudder is not so great, because when the rudder is hauled well to one side it quickly kills the headway and is a great detriment to speed, and should be kept as near the center line of the hull as possible, and still have the boat go to windward.

CHAPTER III

POINTS ON EXPERT HELMSMEN

THE man at the wheel, or tiller, as is more apt to be the case in small racing yachts, is the man on whom the winning of the race depends. It is necessary that he be cool-headed and resourceful at all times, knowing when to take advantage of his opponents, and having foresight to see far enough ahead that either by getting into or keeping away from a luffing match, or something of the sort, he may finally land himself in first place. He should be deliberate, and yet when he makes up his mind to do something, should not ask everybody in the crew their opinion, but act quickly. And in this he has a great advantage over his brothers of a few years ago, in that the vessel he is handling turns almost in her own length at full speed, and is off on the other tack in a

very few seconds; whereas it was an undertaking of almost minutes, so to speak, for the craft of a few years ago to be brought into stays and filled away on the other hitch.

It is an excellent thing, however, to have one man who understands the matter to watch the other boats and keep the skipper informed of their movements, especially when you are leading and the helmsman does not want to take his eyes off his own boat, even for an instant.

Besides these few necessities embodied in the crack helmsman, he should have the finesse in touch on the tiller, never gripping it so that the muscles in his arm are at a tremendous tension, but simply holding the stick as lightly as possible, so that it shall not get away, and feeling his boat in every jump in a seaway, favoring her in every helpful slant of wind, not roughly, but gently, and by so doing keeping her headway.

A very important point which puts the

quick, nervous man at a disadvantage, and especially in the modern boat, is the method of tacking. He is apt to fling her about by forcing the tiller hard down, and thus scooping off to leeward on the other tack before he can stop her twisting motion, and so losing some of the previous distance already gained to windward, besides killing her headway, sending her through a path the shape of the letter "S." A man cannot be too careful in tacking, and he should learn the queer ways his craft has and how to favor her, as every boat is different and should not necessarily be treated as her sister.

Be cool, level-headed, know your boat from the top of the mast to the bottom of her keel, notice her sails and how she feels best to you; in other words, when she feels sympathetic she is probably doing her best for you; then note how everything stands, treat her as a living thing and not as pure wood and metal; know the distance she will travel in certain conditions in a given length of

time; know her every mood. Racing yachts do have their off days; treat her accordingly.

The man steering should never place himself in a cramped or uncomfortable position, but should be so situated as to be able to see his boat and sails. Lying on one's stomach on the weather rail is distinctly bad, as it means a broken neck to see what should be seen. Do not do this unless you can sail your boat by the feel of the helm, as only a very few of the best skippers can do.

Know when you have the right of way and take it, unless you are going to spoil your chances of a win by accident and smash up with another boat, then merely tick your opponent, or let him go with a few words of advice.

Know enough about your racing rules to cover any bluff, and never take unnecessary chances unless they are absolutely essential, but where they are needed, play the game for all it is worth, as every second counts in the racing boats of to-day.

CHAPTER IV

SET OF THE RACING SAILS

THE set of the racing sails, the all-important factor, the only means of propulsion for the wind-driven craft, means something in itself, as the yacht with this power alone moves at a speed faster than a great many of the largest steam yachts.

The curvature, smoothness, correct cut and shape, rigidity, and staying power of the cloth, sometimes as light almost as a handkerchief, are great factors in the yacht's speed. Do not treat the sail as an inert object, there is life in its every movement, and it is the engine that drives the yacht, the wind, the power.

This subject cannot be covered in a chapter or a volume, or possibly in many volumes, as there is considerably more in a sail than appears to the casual observer. Men of brain and thought have worked for years trying to

find out the correct sail and reach a belief in certain theories, only to have their ideas shattered at some future time. It seems almost an impossible equation to solve the power of wind on sails. The best sailmakers of to-day differ in their opinions as to how the different sails should be cut, fullness here, fullness there, a little more sweep to foot or head, the angle of the gaff to the hoist, and a thousand other details. Who is correct? Some say one, some say another, but nobody knows. Is it a possible thing to ever find the correct answer?

How should the sail be made to get the greatest driving power, point into the wind's eye, and have the least resistance for the movement through the atmosphere? And again, should this perfect sail be changed in shape to suit more exactly the type of yacht it is going to drive? There is no doubt about it. The sail should fit the boat's model; that seems to be the general opinion, but we do not actually know it; it is simply an opinion.

On the present small racing yachts of the knockabout type, where the area is restricted to small sails, the best mainsail, with the greatest driving power, is one cut with a fair amount of draft or fullness in by the mast, an easy sweep to the center, and flattening out to a flat plane at the leech. This makes a nice hook for the positive pressure to work in and drive the boat ahead, and also allows the negative energy of the wind to escape freely and with the least possible resistance over the flat after end of the sail, this, of course, applying on windward work alone. Off the wind the entire area is positive pressure and driving the boat ahead. I am not considering the action of the lateral plane on the water.

The jib should be of the same general idea, a little fullness along the hoist and a flat leech. If the leech of any sail has a tendency to hook over, wooden battens placed in pockets in the sail at right angles to the leech will flatten it; and if it still has a tendency to

Dead before the wind. A good example of the high-cut spinnaker

A good example of light sails

angle over at the inner end of the battens, the sail needs hauling out on the boom and gaff. The expensive sails of to-day, cross-cut, that is, with the cloths running perpendicular to the leech, can be cut close to the limit on the measurements, as the tendency to stretch is very much lessened over the old-fashioned up and down sail. The reason for this is in the weave of the cloth. It is composed of a plain weave lengthwise of the cloth in the warp, and the cross thread is the filling. The filling thread shows almost no corrugation from the action of the loom, it being all in the warp; there being thirty per cent take-up in the warp and ten per cent in the filling. This shows the amount of corrugation in the warp thread, and the minute strain is put on this cloth the warp has a tendency to straighten out, consequently stretching the cloth. Thus the cross-cut arrangement of cloths simplifies the matter for both makers and users.

In drafting the general plan for the shape of sails, keep the type of craft in view. If she

is powerful, a high narrow rig with a high center of effort is advisable; if she is light and tender, make the rig lower. The boom at the mast should be well above the deck to insure a free draft of wind when heeled down in moderate weather, and the entire sail can be lowered down in a heavy breeze if there is a sliding gooseneck. The angle of the gaff to the mast should not be too small, as it is difficult to make the sail set with too high a peak. The jib should be placed well off the deck and preferably on a short bowsprit, in order to insure a good draft and the use of every square inch of canvas, providing there is no restriction on the fore triangle area. It should also be held well away from the mast so as not to throw back-wind into the mainsail. On the other hand, the jib should not be set too far forward, thereby spoiling the unity of the plan by so splitting it up.

A great many people believe in the high narrow rig, as the sail is then cutting a longer column of air than the lower rig with the same

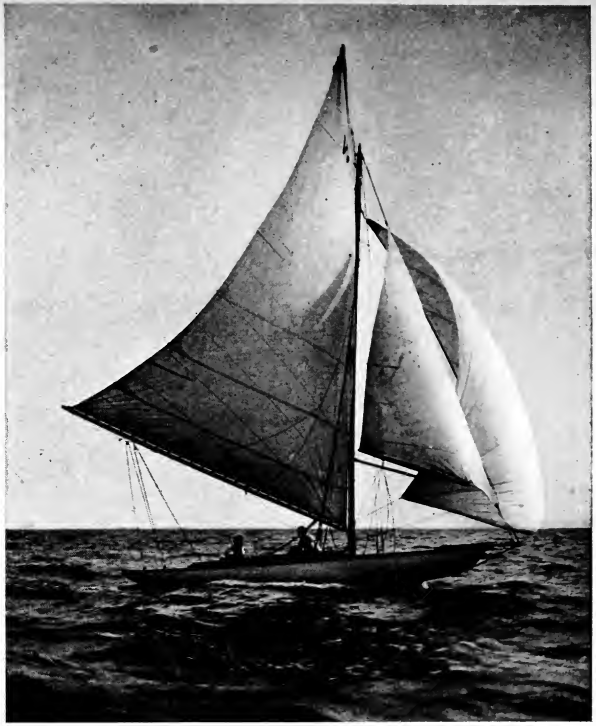
area would, but it is more difficult to make the high rig stand to its work in a breeze, and consequently should not be overdone.

The weight of the cloth is another important factor in the set of the sail. Five to seven ounce duck of the most expensive sort is about the right weight for a mainsail of five hundred square feet in area, with a jib of the same weight. For a mainsail of seven to nine hundred square feet the weight should be eight to ten ounce.

The light sails on the small racer should be cut and set correctly, as well as the working suit. It is well to have two sizes of spinnakers, as when there is enough wind blowing to lift the sail, then you can stand one of greater area, but in the light winds, either dead before it or slightly across the wind, the small sail will fill out and do its work better, as it is cut well off the water and does not lap past the mast so far. It thus allows a draft past its edges which the larger sail will not do. I believe thoroughly in the small spinnaker

over the very large one, as it is possible to carry it well forward in a breeze and utilize it for a balloon jib, which sail is not allowed on most of the racing knockabouts. I have won many races solely due to a small, well-setting spinnaker carrying it even to windward in very light drifts, when on account of its light texture it was the only sail that showed full and drawing. Some people have a theory that you should put all the cloth possible into a spinnaker, regardless of the shape and set. This seems to me wrong, and I consider it an error to get the wind piling up against itself in a great bag, rather than a moderately flat sail that allows the wind a chance to escape around its edges, and in its stead getting the full force of the new air, which seems to have greater force and drive. Always keep your spinnaker pole as nearly at right angles as possible to the direction of the wind; too much care cannot be used in this matter. Also the spinnaker sheet should be worked in conjunction with the guy, keeping the sail at

A quartering wind with spinnaker set in proper position, well forward and drawing well
No balloon jib necessary



Running up on a sea before the wind, showing bad lift of main boom and correct way of spilling wind from spinnaker into jib

An excellent example of a beautiful suit of sails, and long taper spars

all times straight across the wind, and not allowing it to fill out around the head stay, thereby getting back-pressure, as well as forward.

In balloon jibs the cut will vary according to the shape of the fore triangle. But the important thing is to be sure the luff is set up at great tension, as a slack luff will mean a poor sail. The sail should stand well off the deck and water, so that the lee-bow wave shall not be thrown into it to any great extent. It should also come fairly well aft, to allow for bellying out to leeward, as the sail is not carried to windward in a breeze on account of being made of too light duck, and also because of the tendency it has to back wind the mainsail.

The No. 2 balloon sail, or sometimes called "reaching jib," is made of heavier cloth, cut considerably smaller, and can be carried with the wind fairly well ahead, even to windward in light weather.

In reefing, great care should be used in

pulling the sail out on the boom. It should not be more than hand stretched, and if there is rain or fog during the race, be sure to shake out your reef on returning to the mooring. It is also a good idea to loosen up the head and foot on the spars and allow the sail to shrink evenly as much as it will, rather than hold it taut on the spars while the center contracts, thereby getting a hollow leech. Little points of this sort are invaluable in the life and set of the racing sail, although a little more trouble at the time.

CHAPTER V

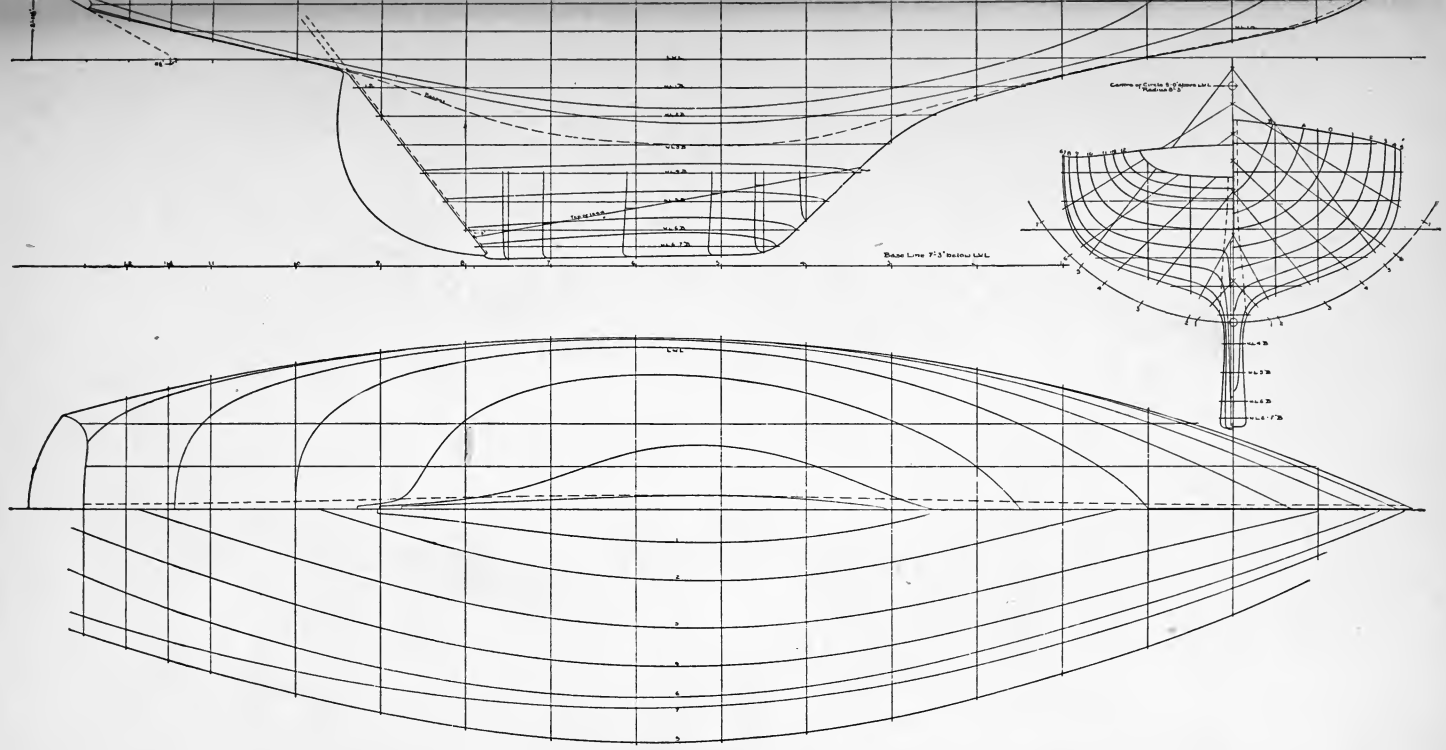
CONDITION AND CONSTRUCTION OF THE BODY OF THE YACHT

THE racing surface or the outer skin of a yacht depends largely on the material, workmanship, and designed type of construction.

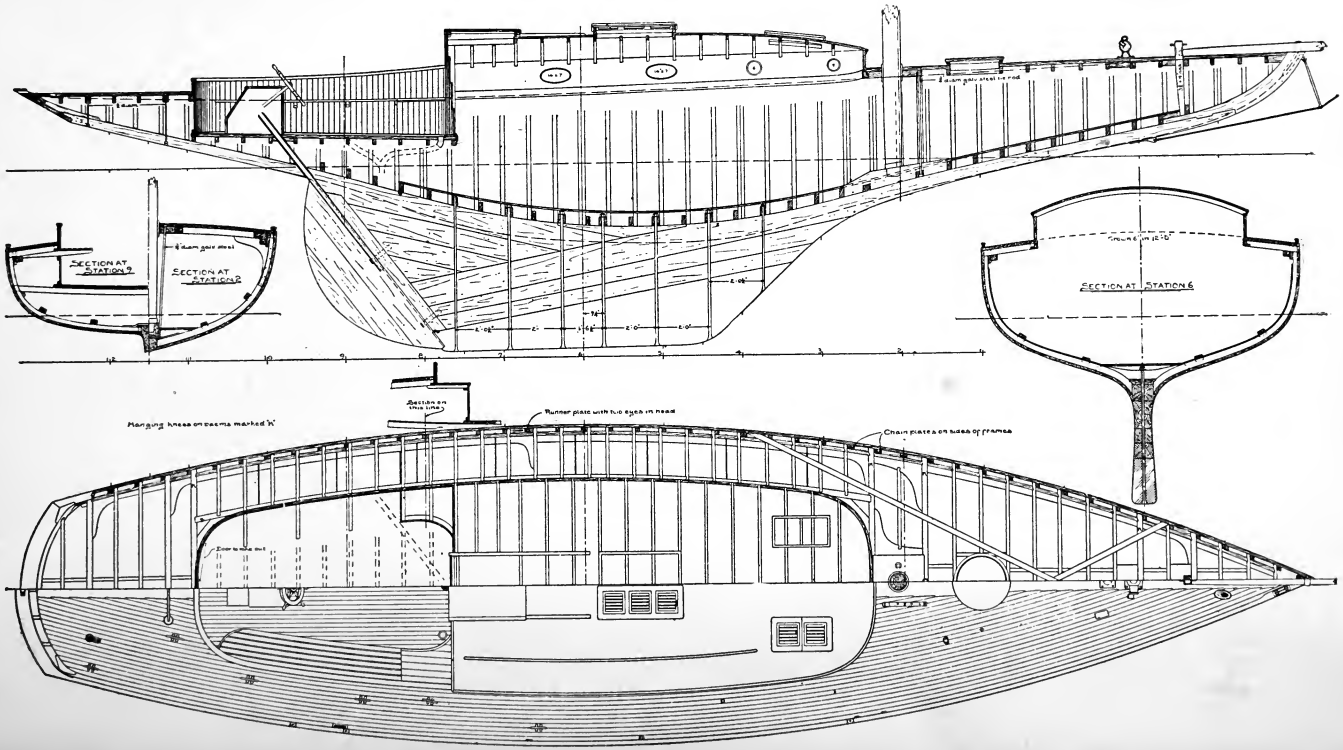
If the yacht has an excellently planked body, thoroughly smoothed off, sand-papered, and rubbed to a high polish, and the internal construction is not sufficiently well designed to take the twisting strains, thrust of the mast, etc., then the best surface that can be prepared on the railway cannot hold its smooth form, because the yacht in twisting and pounding squeezes the putty and corking from the seams, and long lines of rough ridges appear on the surface. This makes it necessary to haul out again, which is a nuisance and an added expense.

In double-planked boats, of course, this trouble is eliminated. The cost of building, however, is necessarily greater, but it is not every builder who can double-plank a thin skinned boat successfully; keeping the outer skin perfectly tight so that practically no moisture can get in between the skins and so warp and swell them that the surface becomes humpy and the planks split. It is necessary to have the stock for double planking thoroughly dried and put together in the most painstaking manner.

For the above reasons, it is usually preferable to build the racer single skinned, and to build her early in the year, so that she may have a chance to settle into shape as the units in her construction become settled, also that the putty may harden, thereby having much less tendency to be squeezed out after launching. This will give the advantage, in at least the earlier spring races, over the yacht that was hurriedly built at the last minute and put overboard. This one will not show the sur-



DESIGN 21*a*. Lines of the popular type of 30-foot water line cruiser and racer. Showing long shoal keel, good deadrise, and easy high ends



DESIGN 21*b*. Construction plan of 30-footer

face, and is much more apt to twist and pull out of shape, feeling to a person on board actually limber as compared with planking of the other, which is hard and firm.

Another nice way of constructing the light skimming dish racer is the plan adopted by the Canadians for the last ten years in their Seawanhaka Cup boats. This is to use some hard wood, such as Spanish cedar or mahogany, flush seamed and fastened to the frames with small brass nails or tacks, clinched over on the inside of the frame, and with the head, which is small, left flush on the outer surface. This construction is, perhaps, more liable to leakage, but it is a splendid foundation for an exceptionally high-polished surface.

If, when a yacht is hauled out on the railway for cleaning and a surface, she is not allowed to thoroughly dry out, and the planking remains damp and punky, the surface can never show or take a high polish, on account of the soggy foundation. Air the boat out, if the weather is good, as a thorough drying

never seems to hurt the little racer, and will always help materially toward a good racing surface.

BUILDERS' SPECIFICATIONS FOR SONDER CLASS YACHT

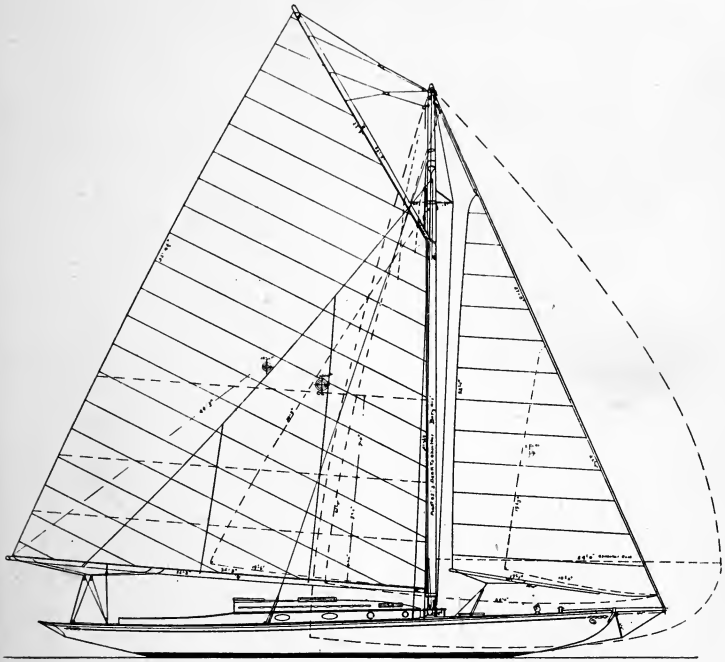
(This general form may also be used for almost any small class of racing or cruising-yacht.)

Specifications No. 00

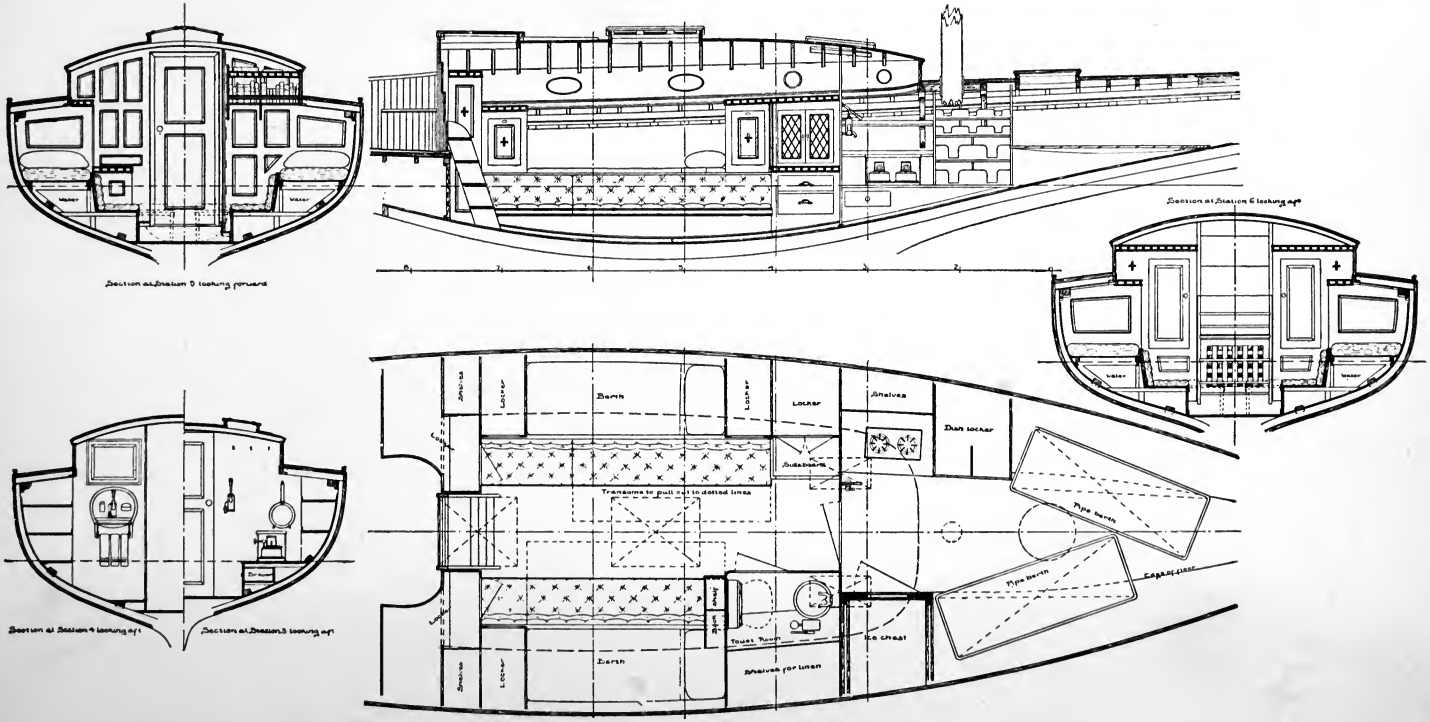
In General

In carrying out these specifications, it is understood that all workmanship and materials shall be of the best procurable of their kind, in every respect; that the stock shall be clear, well seasoned, and free from all defects; and that the boat shall be built, fitted, and furnished with everything necessary and customary in a boat of this type, whether specially mentioned in these specifications or not.

The specifications and drawings are intended to co-operate, so that any works exhibited in the drawings and not mentioned in the specifications, or *vice versa*, are to be executed the same as if they were mentioned in the specifications, and set forth in the drawings, to the true meaning and intention of the specifications and drawings,



DESIGN 21*c*. Sail plan of 30-footer showing very short bowsprit and moderate rig, a good combination for ease in handling



DESIGN 21*d*. Cabin plan of 30-footer, showing roomy accommodations for a comparatively small bodied boat

without any extra charge whatsoever. No change to be made from the plans or specifications by the builder, except upon written instructions from the architect.

Dimensions

Length over all	Beam
Length on L. W. L.	Draft

Moulds and Ribbands

Moulds, made accurately to fit the design, to be spaced every two feet, six inches, accurately lined up and braced to keep them in their positions. Ribbands to be of hard pine at least $1\frac{1}{2}''$ $\times$ $1\frac{1}{2}''$, secured to the moulds and closely spaced. The keel to be thoroughly stayed to prevent it from being moved during construction. Moulds to be left in the boat until she is sufficiently built to insure her holding her shape.

Ballast and Keel Bolts

Ballast to be . . . lbs. of lead in a solid smooth casting, which is to be weighed and a record kept of all trimmings. Lead to be bolted to keel with two 1″ and two $\frac{5}{8}''$ diameter bronze bolts, headed, or with nuts screwed on the lower ends, and set up with nuts and washers through oak floors and keel, as shown on plan.

Keel

Keel of oak sided the same as the rabbet for entire length, and moulded 4″ abreast of fin. Keel to be steamed and bent to shape shown on plans, and thoroughly held to that shape.

Deadwood

Upper part of deadwood to be of Georgia pine, lower part of Georgia pine, as indicated on plan. Edges of deadwood and keel to be thoroughly painted before bolting together.

Stem

Hackmatack natural crook, sided $2\frac{1}{2}$″ and moulded as shown; to be fastened to keel with three $\frac{1}{4}$″ diameter bronze bolts set up with nuts and washers.

Sternboard

Mahogany $\frac{3}{4}$″ thick, fitted with suitable cleats on forward side, to take ends of planking. Sternboard to be steamed and bent to the required shape and secured there.

Frames

Selected white oak $\frac{3}{4}$″ × $\frac{3}{4}$″ steamed and bent to shape. All frames to be spaced 6″ on centers. Fourteen frames abreast of mast to be $1\frac{1}{8}$″ × $\frac{3}{4}$″, as shown on plan. Seventeen frames abreast of

fin to be butted on keel, as shown in midsection. All other frames to be in single lengths from gunnel to gunnel, except three pairs in bow and three pairs in stem, which shall be single moulded from hackmatack natural crooks.

Planking

White cedar of as light weight as possible. All planking except garboards where shown, to be $\frac{5}{8}$″ *finished.* Garboards of Georgia pine 1″ thick amidships. Planking to be in as long lengths as is possible and have the best of stock. Butts to be well shifted. All planks to be rounded or hollowed wherever necessary, to accurately fit shape of moulds.

Floors

All main floors to be of oak, others of spruce, except one in extreme bow which is to be of hackmatack. Two floors through which 1″ keel bolts set up, to be sided $2\frac{1}{2}$″ in the middle, and moulded and tapered as shown on plan. One floor forward and one floor aft of these to be sided 2″, otherwise the same. One floor forward and one floor aft of these last-mentioned floors to be sided $1\frac{1}{2}$″ throughout, and moulded to conform with the others. One floor at each end of the L. W. L. to be sided $1\frac{1}{2}$″ and moulded 2″ in the

middle, and tapered to ends. One deep floor at mast, as shown in section, sided 1″. All other floors to be sided 1″, and moulded 1½″ in the middle, and tapered to ends. Floors to extend between bilge stringers except where shown differently. Four large floors abreast of fin, and one at each end of the L. W. L. to be tied to the bilge stringers with brass knees screwed to both floors and stringers.

Clamps and Bilge Stringers

Clamps of Georgia pine in single lengths, 1½″ × 2″ in the middle, tapered to 1″ × 1½″ at ends. Bilge stringers of spruce ¾″ × 3½″ amidships, and tapered as shown on plan. Stringers to be set on edge at angle shown in midsection, and lapped by each other amidships as shown. Stringers to be connected with deck beams by pine struts where shown. White pine truss on bilges for about 25′ amidships, as shown on plans.

Deck Beams

Two partner beams and beam at each end of L. W. L. to be of oak 1½″ × 1½″. Beam at jib stay, beams at each end of cockpit, and traveler beams to be of oak 1¼″ × 1¼″. All other beams to be of spruce ¾″ × 1⅜″. All beams to be notched

over clamps as shown. All beams to be spaced 9″ on centers except where otherwise indicated. The center line of the deck is to be straight from stem to sternboard, and beams crowned to conform to this.

Deck

Deck of $\frac{5}{8}$″ white pine, tongued and grooved, covering boards of mahogany 2″ wide. Deck to be painted except covering boards, which are to be finished bright.

Bracing forward

Backbone forward composed of two $\frac{3}{4}$″ spruce boards shaped as shown, lapped by each other abreast of mast and securely bolted and screwed together, as shown. These boards to rest on frames and be notched carefully over floors. Fastenings to be $2\frac{1}{2}$″ brass screws from outside through keel, just clear of every other frame. Backbone to be braced by a pair of 1″ hackmatack knees where shown, and by vertical spruce struts between keel and deck where indicated. Two $1\frac{1}{4}$″ × $1\frac{1}{4}$″ light weight galvanized steel angles connecting deck and backbone where shown. Two $\frac{3}{8}$″ diam. galv. steel tie rods connecting partner beams and backbone. At forward end of L. W. L. a $\frac{1}{2}$″ diam. galv. steel

bolt to connect large floor with deck beam. Bolt to set up on deck with a nut and large washer.

Bracing Aft

Backbone of spruce $\frac{3}{4}''$ thick, shaped as shown; to be fastened in the same manner as the forward backbone. One $1\frac{1}{4}'' \times 1\frac{1}{4}''$ light weight galv. steel angle connecting deck and backbone. Tie rod and strut at after end of L. W. L. the same as that at forward end. One $\frac{1}{4}''$ diam. galv. iron tie rod connecting traveler beam and backbone, also one $\frac{1}{4}''$ diam. rod connecting after traveler beam and transom knee.

Cockpit

Cockpit to be open. Coaming of $\frac{3}{8}''$ oak. Floor of $\frac{5}{8}''$ white pine slats 3″ wide, laid directly on floor timbers with a $\frac{1}{4}''$ interval, and made removable. Slat seats of $\frac{5}{8}''$ mahogany, as shown, made removable.

Knees

Two pairs of lodging knees of $1\frac{1}{4}''$ hackmatack abreast of mast. One pair of $1\frac{1}{4}''$ hackmatack hanging knees on after partner beam. One pair of 1″ hackmatack knees bracing backbone forward of mast. Three 1″ knees on sternboard.

Mast Partners

Mast partners of $1\frac{1}{2}''$ spruce thoroughly rodded with $\frac{1}{4}''$ galv. iron.

Chain Plates

Two chain plates of Tobin bronze $1\frac{1}{4}'' \times \frac{3}{16}''$ extending 4″ beyond bilge stringers, as shown on plan.

Chain plates to be through fastened to planking and keel with $\frac{1}{4}''$ bronze bolts.

Rudder and Tiller

Rudder blade of oak next to the stock, and yellow pine on the outer edge; to be thoroughly rodded together with composition. Stock of seamless brass pipe $1\frac{1}{2}''$ outside diameter. Trunk of seamless brass pipe $1\frac{9}{16}''$ inside diameter. Oak tiller three feet long with ball cut on end, to be fitted to rudder stock with bronze jaws, cap, and bolt. Tiller to be so arranged that it may be lifted upright, but not fall below the position shown on plan.

Metal Work and Fastening

All metal work to be of the best bronze, unless otherwise specified. All iron work to be carefully wrought and galvanized. Galvanized iron fastenings to be used for deck, cockpit floor, and

clamps. Plank fastening to be copper, burred over washers; heads countersunk and bunged. Brass screws to be used where it is impossible to rivet. Floors to be fastened to keel with $\frac{1}{4}''$ galvanized spikes driven in angling and to the frames with copper.

Painting and Varnishing

Hull to be calked with cotton and carefully smoothed, given priming coat of filler above and red lead below water-line, seams filled with putty to match color of wood, and varnished or painted two coats above the water-line, and painted two coats of green enamel copper or some approved anti-fouling paint below. Name, $\frac{1}{2}''$ stripe and scrolls to be cut in and gilded with gold leaf. Deck to be primed and painted two coats of approved color. Cockpit, coaming, tiller, etc., to be varnished three coats. Inside of boat to be painted two coats of approved color.

Sails, Spars, and Rigging

Sails to be supplied by owner, but bent by builder.

Blocks as per special list.

Spars to be all solid, of the lightest weight spruce, clear and sound. Wire rigging of plow steel wire rope.

Shrouds $\frac{3}{4}''$ c.
Jib stay $\frac{3}{4}''$ c.
Preventers $\frac{5}{8}''$ c.
Pennants $\frac{5}{8}''$ c.
Gaff bridle $\frac{5}{8}''$ c. flexible.
Boom bridle $\frac{5}{8}''$ c. flexible.
Peak and Throat halliards $\frac{5}{8}''$ c. flexible.
Jib halliard $\frac{5}{8}''$ c. flexible.
Balloon jib halliard $\frac{5}{8}''$ c. flexible.

Manila rigging of best four-strand rope.

	Thread		Thread
Main sheet	15	Runners	9
Main sheet purchase	9	Halliard purchases	9
Jib sheets	12	Topping lifts of $\frac{1}{4}''$ d. cotton.	
Spinnaker halliard	12		

Bronze turnbuckles (latest pattern) for shrouds $\frac{7}{16}''$.

Bronze cleats. Halliard cleats 5″; mooring cleat 8″; main sheet cleat 7″; jamb cleats for jib sheets and runners.

One 9″ and one 6″ bronze traveler.

Spreaders of galv. steel tube to band on mast.

Equipment

One 25 lb. galvanized iron folding anchor; 30 fathoms of $1\frac{1}{8}''$ manila rope; paper bucket; double acting brass pump with hose, large size; one ring buoy with name of boat painted thereon. Boom crutches of hard pine.

CHAPTER VI

USES OF PAINT AND BLACK LEAD FOR OUTER SURFACE

THE discovery of some mixture for the coating of a yacht's bottom that will fill all the needs of the racing yachtsman is still far from being made. The ideal surface coating for a racing yacht should embody the good qualities found in copper and white-lead paint, black lead, and any other racing compounds of note. The qualities necessary in a perfect covering are smoothness, giving the least possible friction to the water, durability, or being able to stand the action of salt or fresh water without softening or losing its luster, and the ability to keep off any growths of animal or vegetable nature. Another quality should be that exposure to the sun's heat shall not blister or soften the coating.

The matter of expense is, of course, an object to a great many people, but surfaces that are in common use to-day cost a hundred times more than any covering or coating in reason could possibly sell for, as now it is necessary to haul the racing boats out every week in order to have the best possible surface.

From my experience, both with salt and fresh water, pot lead or graphite polish, properly looked after and applied, seems to be the best racing surface for the small boat, the great objection being that it is not good for more than a week, as it softens after being submerged and becomes spongy.

I think the best preparation of pot lead to-day is the graphite powder called "Black Silk" mixed with spirits and varnish, so as to make a mixture slightly thicker than paint, applied to the hull with a brush. This, allowed to dry, becomes fairly hard and dull black in color. Then rub down with fine sandpaper, or old pieces that have been worn more or less smooth, so that the grains shall

not cut the surface. This hardens, and it becomes a shiny, smooth surface. Then a rub-down with emery-paper, and lastly use newspaper for the final polish. The surface depends largely on the amount of elbow grease and labor, combined with care, that is put into it. The lead should not be put on the plain planks, but should have for a foundation a hard, smooth coat of white-lead paint to give it a body.

The first few coats of black lead will not be as satisfactory as the ones later in the season, and each coat put on is better than the preceding one. You should never attempt to paint over black lead, as the paint will not stand, but very quickly peels off, much to the disgust of the owner. There is no benefit in using pot lead unless the owner is willing to haul out his boat very often and renew it, and it is not as satisfactory as a good surface of paint, unless you are willing to do this. Remember that it becomes foul very quick, and then is a great disadvantage.

There have been in the past few years many different sorts of composition, each one claiming to be far better than the last. This may be so, and every one for some reason or other has his pet composition; one reason being that it is easier to secure, another, that it is better suited to the condition and temperature of the water where the racing is done. I do not think there is much difference between the best grades manufactured by the best people.

For the under-body the light green copper paint with a certain amount of varnish in it seems to be as satisfactory as any. It stands very well, and I have seen it, in some cases, come out after one or two months' submergence with a good gloss and shine. Barnacles, however, had adhered in certain places, and a few little bunches of weed showed, but on the whole it was very good.

The regular copper paint used on many of the large vessels is, of course, an excellent preservative against worms and vegetable

growth, but it is very difficult to get a racing surface out of it. In the warm southern waters it is absolutely necessary to have some protection against boring worms and other animals, as they will soon perforate the planking and cause much trouble.

For the topsides a nicely smoothed surface of white paint or black varnish, standing hard, is about as good as anything, and has many believers among the racing fleet, with a good foundation for their belief.

Varnished mahogany topsides, when well done and cared for, compare favorably with anything; but they are a great care, and it is necessary to keep working on them to preserve the surface free from seam trouble and scratches.

On this matter of racing surface a great deal can be said, according to the weather conditions in which it is to be used, and I know of no composition that can be said to be the best under all conditions.

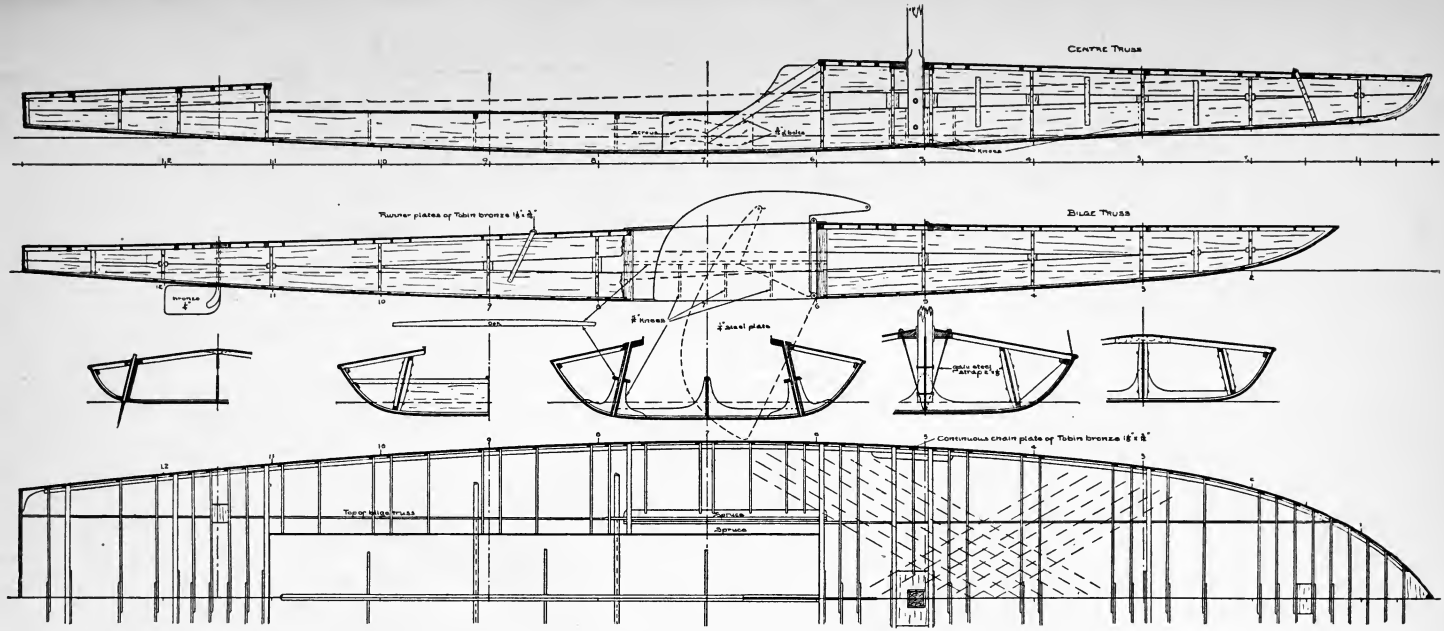
Further, it cannot be impressed too strongly on the racing yachtsman that the skin friction should be reduced to a minimum in order to obtain the greatest speed.

CHAPTER VII

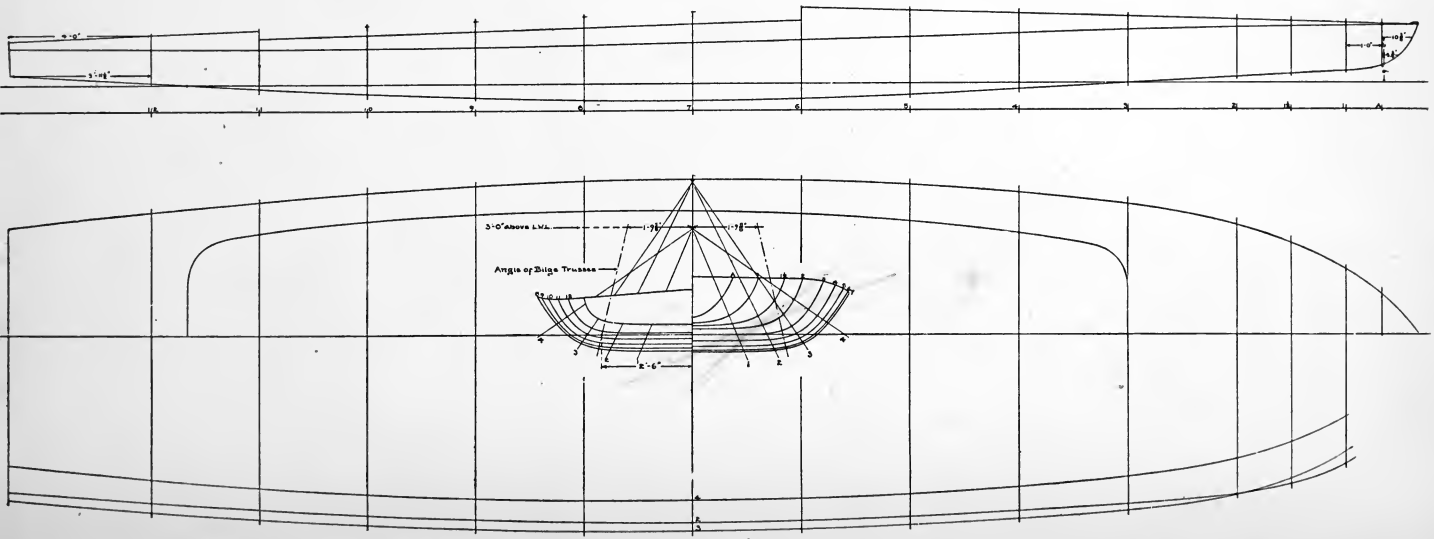
CANVAS *vs.* WOODEN SKIN

NOT a great deal can be said in regard to canvas and wooden planks for the outside covering of yachts. Canvas stretched tightly over very light wood construction is the lightest possible skin that will stay tight without leaking. In small racing boats of twelve or fifteen feet in length, built of, perhaps, one-quarter inch planking or even less, no room is allowed for calking or sealing against leakage, and thus canvas tightly stretched and smoothly put on, and properly filled and painted, does away with all necessity of calking and keeps the boat tight.

The largest racing boat I have ever seen with a canvas skin was the Quincy Cup Defender "Outlook," a large freak racing scow. She was fifty-five feet long on deck, twenty-one



DESIGN 26*a*. Construction plan showing plank-on-edge trusses, diagonal decking, and bilge boards, as used on a Seawanhaka International Cup boat

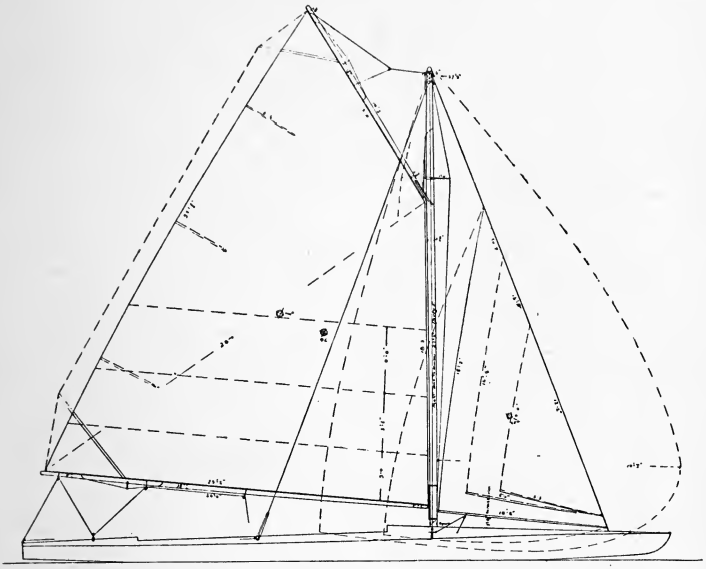


DESIGN 26*b*. Showing the exaggerated scow form and shoal body of Seawanhaka International Cup boat

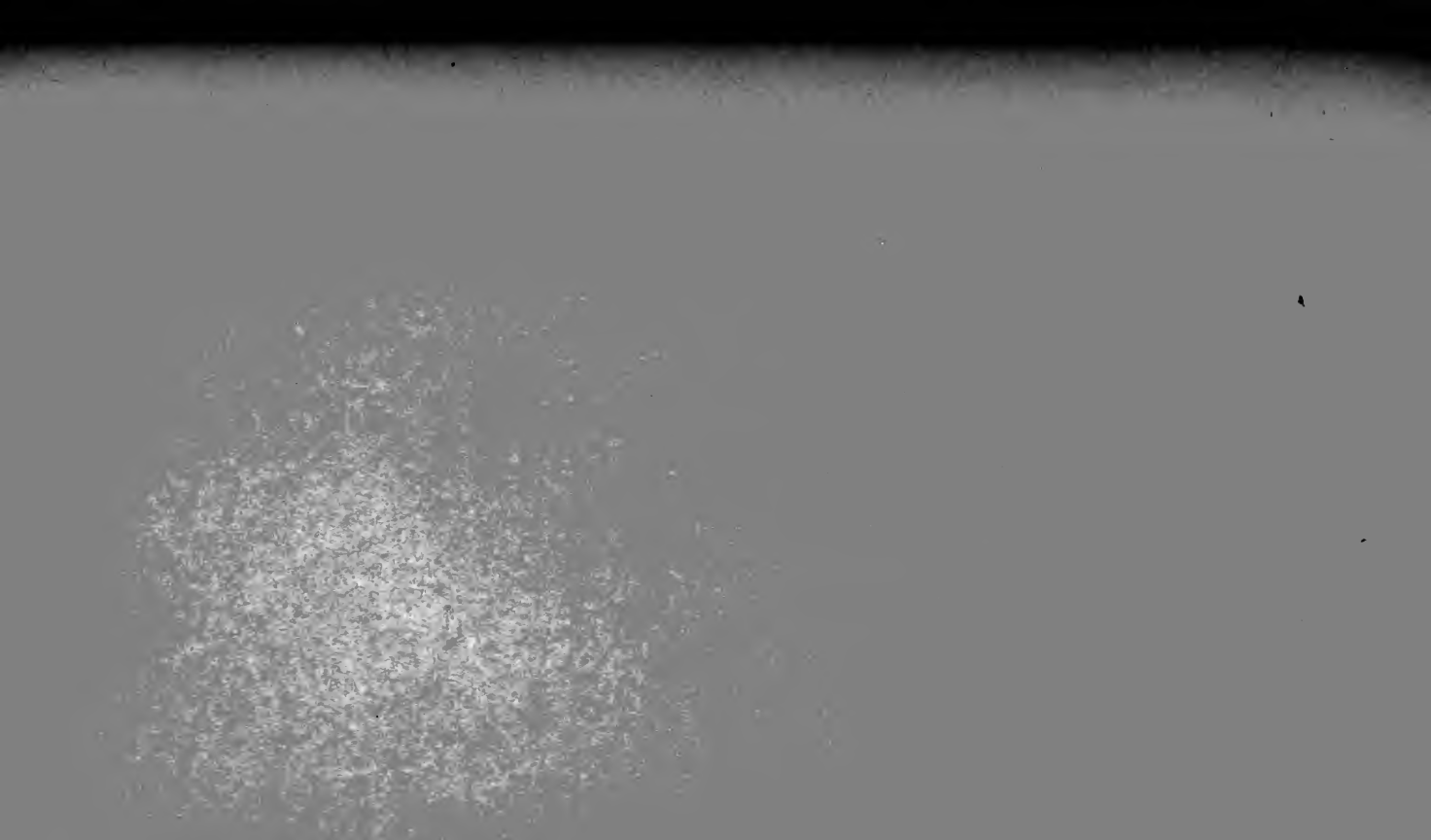
feet water-line, and fifteen feet wide, built of light one-half inch white cedar over a steel frame and covered with canvas. Canvas construction was used to a great extent on our Western lakes a few years ago, but it is fast going out, as it is difficult to stretch it over the flat scow of to-day and make it stay in place without battens tacked on the outside running fore and aft. If any water should get in the boat, and it is impossible to keep it out, it quickly runs through the planks and gets in between the canvas and the planks, thereby swelling the canvas and making it baggy and lumpy, and necessitating cutting a hole in it to let the water out.

This same canvas construction was used on a few of the American challengers for the International Trophy, the Seawanhaka Cup, but without success. It is all right up to a certain point and for freak boats, but generally where planking is restricted it is much more preferable to accept the full thickness of the plank and do away with the canvas.

On the other hand, there are no seams in the canvas to contend with, and you can get a splendid one-piece surface; but I am still of the opinion that the wood will take the higher polish, either in black lead, paint, or varnish. It is almost impossible to keep canvas from moving so not to crack a smooth unelastic surface, and varnish or hard paint once cracked is a difficult job to patch up. Canvas is, however, universally used for deck covering, and makes an exceptionally tight construction. It makes, also, an exceptionally good footing when the deck is wet, being better to walk on than any other form of deck. It can be sandpapered near the rail and water-way, so as to provide little friction with the water on deck, and left rough in the main to provide a sure footing for the crew to work on.



DESIGN 26*c*. Sail plan showing the queer centered rig of the Seawanhaka boat, the sails being inboard both at bow and stern



CHAPTER VIII

HAULING AND DRYING OUT

HAULING out between races for the purpose of repairing, drying, and polishing is of great importance in the racing boat. The boat must be clean, light, and in repair in order to be able to get the most out of her.

In hauling out the owner should not always trust to the person doing the work, unless he is sure that he knows his business. When the boat is clear of the water and in position, timbers should be placed under the long ends for support, in order to keep them from drooping; also supports or shores should be placed at the bilges. It is a good thing to run lines from the masthead well out to either side in case of emergency, the shores sometimes being accidentally knocked away, and as the modern boat is only resting on the

cradle for a few feet amidships she is in a very ticklish position, and should be handled carefully or the consequences may be very serious.

See for yourself that she rests properly on her fin if she has one, and that she is comfortable in the cradle, with enough props to make things secure. Do not allow the shores or supports to be *driven in* under the long overhangs, as that is as bad, and sometimes worse than none at all. Shores so driven in are apt to spring and soften the ends, putting the yacht out of shape. Careless people often do this, and afterward wonder why the ends droop and rise when the strain of sailing is on them. Be sure the weight of the hull is properly distributed on the different supports. Have the skylights, hatches, etc., removed so as to allow a free circulation of air throughout the body, for when the yacht is on land the air in the hull is not kept cool by the outside elements as it is when in the water, and the sun playing and beating down on the boat

will make the inside air steam and thoroughly saturate everything if not allowed to escape when heated.

If your boat is to be hauled out in preparation for a series of races it is an excellent scheme to cover her with a canvas tent, getting thereby the warm drying air, but not the intense heat of the sun's rays, which are sure to shrink the planking and make it leak. Remember, also, that black paint and pot lead draw the sun's rays a great deal more than white or light colors, the dark colors sometimes getting so warm that it is almost impossible to hold the hand on them.

These few points I mention may seem to a good many of no account, but they are well worth considering, I am quite sure.

CHAPTER IX

RIGGING, BLOCKS, ETC.

THE art of rigging, and such it can well be called, plays no small part in the success of the racing yacht. The rigging is part of the driving power and is the cylinder and crank shaft of the engine, and must be of the right strength, weight, and proportion throughout.

To be perfectly sure of the rig of the racer the various parts should be subjected to strain before they are put on the craft, and in this way one can be fairly sure of their ability to stand the wind pressure.

The blocks that are mostly used to-day are made of yellow metal with Tobin bronze pins, sheaves, and shackles, thereby making more secure the parts that are apt to give way. If the blocks are to be used for wire rope, especially the main halliard blocks, it is

well to have them made to order, with a large diameter sheave or wheel, something after the style used on the wire-rope derricks. These large sheaves prolong the life of the wire, and the guards prevent the wire getting out past the edge of the sheave and wearing through.

In the blocks for manila rope it is always well to have them large enough for the rope to run freely when swelled by water. This may save, some day, a grave disaster through not being able to get your sail down when it is very necessary to work quickly.

Wooden blocks are not often used on the smaller classes, on account of their weight and clumsiness, but for anything over twenty-five feet water-line and one thousand feet of sail they are, I think, preferable to bronze, as they are reliable and easy running.

The size of the wire standing rigging, more especially the main shrouds, should be thought out very carefully. The strain here is very great, and it is essential that the mast-

head stand straight and rigid in order to hold up to its work the driving peak of the mainsail, and not allow it to sag off to leeward and spoil the drive. The ability of the craft to capsize, the height of the mast above deck, amount of sail to be carried, shape of mainsail, width of spreaders, and spread of the shrouds at deck are points that govern the size of the shrouds. There is always some spring in the plow-steel wire now in use, and this must be taken into consideration. On the other hand, there is no need of steel cables to hold the mast of a light racing boat, and I think that the tendency among many is to make the shrouds too heavy, as it is the turnbuckle that usually carries away. Have the turnbuckle heavy, if anything, and the shrouds large enough so that the spring in the wire does not affect the masthead to any great extent.

The lighter grades of flexible wire are now often used for the main and jib halliards, and such wire certainly is very satisfactory, as the

Narrow, scow formed Sonder boat with long, straight side. She was second choice for the American team of 1906. A good example of the high, narrow rig

21-foot water line unballasted racing scow with 1500 square feet of sail area, and 44 feet over all

Close hauled, showing large flat bow of racing scow

mainsail once set up is not coming and going with every draft of wet and dry air, but stands where it belongs.

There is always some give to manila rope halliards, and you are sure to have to set up on them at some time during the windward work. A very good type of halliard is a single piece of flexible wire leading from the gaff bridle through a single block at the masthead down to a purchase or whip, the upper block of which is hooked into the eye spliced in the end of the wire, and the lower block acts as a lead-block. This arrangement when the sail is set up makes practically the entire length of the halliard wire, leaving only a short end on deck of manila, and therefore leaving little manila to stretch. Another way in common use is to have a wire halliard with a manila tailpiece spliced into it, leading through the regular series of blocks, having the wire cut to a length so when the sail is hoisted the wire comes just clear of the cleat and the manila tailpiece is then used for cleating.

The rig of the mainsheet is also very important on the racing boats when it is necessary to play the mainsail, that is, let it out in puffs and haul it in again as the wind changes its direction slightly or lightens. A good rig, and I know no better, is to have two moving ends, the outer attached to a long purchase or tackle which runs through a block fastened just aft of the cockpit to one side so as to clear the forward traveler, if there be two, then aft to the double block on the end of the mainsheet, the two ends of the whip then leading to cleats placed on either side of the cockpit, where the mainsheet-man usually sits. This arrangement allows the mainsheet-man to sit on the rail and play his mainsheet without getting into the cockpit or putting his weight to leeward, using only the whip, leaving the standing part cleated.

Hollow spars are being used by practically all the crack boats in the unrestricted classes, and they have a great advantage over the solid ones, being more rigid, a great deal

lighter, and not so apt to buckle. It is essential, however, to have them hung and stayed up just right, because they will not buckle to any great extent, but break off short. Bands and straps, properly padded, should be used on hollow spars in the place of eye-bolts, screw-bolts, etc., as the shell, which is very thin, should not be perforated.

I have not attempted to go into this matter in any detail, but to simply show up a few of the important points that should be considered.

PART SECOND

PART SECOND

CHAPTER I

HANDLING THE RACING YACHT IN GENERAL

IN handling the racing yacht the skipper or manager of the craft must be sure that she is in the best possible condition for a hard race. This should be done early in the morning, so that when the crew come aboard just before the start they will not find a hundred and one little things to be attended to, such as hauling the sails out on the spars, setting up the turnbuckles, wreathing new sheets or halliards, mending a torn spinnaker, or replacing broken battens.

The boat should be sailed before the race in order to get the sails setting well, and to find out if anything is wrong and needs to be replaced.

This preparation saves a lot of valuable time and worry, and the crew is not hurried at the last minute, but can attend to the various duties of getting the sails properly hoisted, ropes coiled, light sails opened and arranged, boat pumped out dry, and a number of other small details that are always necessary just before the start. The helmsman then has time to read his circular, get his watch corrected with the guns or whistles, study his course, and decide what position at the start will be the most advantageous.

The preparatory gun is fired, and there is five minutes before the starting gun goes. The berthing of the boat then begins, and if the first leg is to windward, the skipper decides to go over on the starboard tack. Four minutes gone; one more to come; he begins to get near the line, filling and easing the sails, giving the boat headway, then killing her; ten seconds more, sheets are trimmed and she passes the mark with a rush on the starboard tack, closehauled, and on gunfire.

Light weather, showing position of crew, placed in order to heel boat to good sailing angle

Just starting to lift windward rudder out of water

A high ended easy formed Sonder boat. She was first choice for the American team in 1907 to go to Germany

Then comes a series of hitches, depending on how the boat is holding her own or defeating her rivals, and it is good policy to keep between the second boat and the mark. Remember, if the fleet splits into two divisions, to use your judgment as to how the wind is going to haul, and then go with that division, as you cannot cover two fleets.

Keep your weather eye on the boats nearest you in a general way, or have your mainsheet-man do it. Know at all times what is going on with the others. If you see the leader in the other division has a lucky streak of wind, and you are defeating your fleet, go for the other man, as he has become your nearest competitor. In crossing his bows put your boat slightly to windward of his course and ahead, in a position to hurt him as much as possible by breaking up his wind. He quickly sees this and comes about, you following suit on the instant, always keeping between him and the mark. Never let him go for an instant, as your advantage in posi-

tion is very valuable, even if he is slightly faster.

On rounding the mark get your spinnaker out as quickly as possible, having decided on the last leg to windward on which side to carry your pole, so that there shall be no delay when once around, because your distance will be a great factor when running before the wind, as it is the other boat which then breaks your wind and blankets you.

Take your time in setting the spinnaker, because hurry sometimes spoils everything, and if the sail is set with a twist in it, or gets afoul of something half hoisted, it means loss. If the third boat is near enough to the second, the second will luff out to windward in order to keep her wind clear. Allow her to do this, but hold your course unless she is near enough to bother you, as a straight line is the shortest distance between two points. In an increasing wind the stern boats get it first and so gain, but in a dying wind your slight lead becomes greater in actual time. When

you cross the finish line get your light sails off quickly, but do not allow any of the crew to walk around before you have finished, as the least movement hurts the sensitive racer.

In racing boats of the knockabout type, with possibly a crew of three, there is no great necessity of heavy men, except when it is blowing very hard; then the weight counts a great deal, as the boat is longer on the water-line, keeps her way better through a sea, and is held a little more on her feet and at a proper sailing angle. In light weather, weight is usually a detriment. It is also a great advantage to have the same crew right along, because they finally get to work as one man. Everybody knows what to do without being told. The helmsman can usually steer the boat and either let go a jibsheet, preventer, or backstay when tacking, leaving only a jibsheet and preventer to be taken in and cleated by the crew. And if the jibsheet-man is quick and gets his jib cleated on the turn or swing of the boat, you will be able to have the crew

always on the rail where the weight tells, and is most needed in a breeze, instead of having one of the crew pulling at the sheet to leeward and fooling around in the water, retarding the boat and losing precious seconds, all of which should be saved in the modern racer, when perhaps ten boats will finish within the space of time of one minute.

In the skimming-dish racer, or the unballasted boat, flat bottomed, long flat overhangs, the positions and actions of the crew are of very great importance. Then it is absolutely necessary for the crew to work from rail to rail, as the boat swings when tacking, attending to their special duties as they move across so as to be in position on the weather rail when the craft fills away. This type of boat is slow in stays compared with the ballasted knockabout, and the skipper can usually give the crew plenty of time if he is careful in the way he tacks. She is light, and consequently her momentum is slight and she loses her headway very quickly. But, on the

other hand, her rudders, if she has two, are small, and you must not jamb them across her too quickly, as they will push sideways through the water and kill what headway you have. Feel that they have an effective turning grip on the water and let them go at that.

In the bilgeboard boats, in use for the Seawanhaka International Cup, it is necessary to house one board each time you come about, leaving only the leeward one down. The mainsheet-man can usually slip the one that is lowered, and the regular bilgeboard-man take up on the other. The jibsheet-man can take care of both sheets which are crossed, the leeward one leading to windward, and *vice versa*, and the helmsman can hold the mainsheet whip for the mainsheet-man as the boat swings, handing it back to him as she fills away. This was the practice on the successful Seawanhaka Cup Challenger "Manchester" in 1905.

These scow boats are designed to sail on a

certain list to get the greatest benefit of the long straight side, and they should not be allowed to heel beyond their angle, because the windage of the side coming out to windward is tremendous, and they are apt to slow up badly when knocked down in the hard puffs. It is much better to give them some mainsheet and sail them through the squall with a good full and going fast; then they are manageable, whereas if you allow them to stop they become unmanageable, and the rudders have no effect, comparatively speaking, as they are small and near the surface. The necessity of good handling shows up more in this type than in any other.

CHAPTER II

LAYING COURSES, SETTING MARKS, ETC.

IN laying out the courses you must bear in mind that draft of water is essential, and there should be at least fifteen feet of water everywhere, if possible, so the boat can sail freely and not drag bottom. Shoal water is quickly discovered, because the displacement wave is very greatly increased and the boat seems to suck and not run freely. Eelgrass and growth of any sort must be avoided, as sailing in these conditions is unfair to the keel boats compared with the centerboards. Points of land projecting into the course, or islands, should be avoided, for if they are in the way it comes down to the most daring skipper getting the advantage on account of being willing to take chances by going in nearer the land, trusting to luck that he will not strike.

The courses are always given on the sailing circular, and the person who sets the marks must be careful to follow the compass direction given, and also be sure to get the length of each leg as close as possible to the prescribed distance, for if it should become necessary to sail by compass, the skipper must feel sure of the position of his marks.

Never take a small ledge of rocks as a turning mark, as is very often done. Each mark should be discernible from the other with glasses, and should be substantially moored so that neither wind nor current can move it.

A bright cone that flashes the sun's rays is an excellent device for marks. This, placed on the top of a ten-foot pole, can be seen at a great distance. The other kind of marks in common use are flag marks, barrels, small boats, lattice triangles, etc., the cone being superior to any other.

CHAPTER III

DIRECTION OF WIND IN REGARD TO COURSE

IN choosing or setting courses the judges must always set same according to the direction of the wind. If the start be to windward, lay the course dead to windward and not slightly off; the starting line at exactly right angles to the wind and the first leg, making port and starboard tacks equal in benefit, as far as the wind is concerned, thus allowing a boat to start at either end of the line.

If the course is a reach to the first mark, place the leeward mark at the end of the line nearer to the first rounding mark, so in case the boats go over on gun-fire the leeward boats will have their wind clear; this gives a chance to spread out, and does not bunch the fleet on one spot at the weather end of the line.

If the start is dead before the wind, the line should be set as to windward, making all

parts of the line equally advantageous to start from. The most satisfactory start is the windward leg first. This gives a chance for maneuvering at the start and brings seamanship and skill into play for the berthing of the boat, and is really the most exciting and scientific part of the entire race, because getting away first in the weather berth means minutes as racing is carried on to-day. On the other hand, anybody can go over with sheets lifted or before the wind, and the skill then comes in getting clear of the fleet after the send-away.

In a great many cases the racing clubs are restricted in setting their first mark on account of a harbor or ledge that cannot be escaped or passed except in one direction. But if it is possible for a club to start their races in the open, then the direction of the wind as regards the laying of the course can be worked out in the correct manner, and the start then affords much more pleasure to the contestants.

CHAPTER IV

FLYING AND TIME STARTS

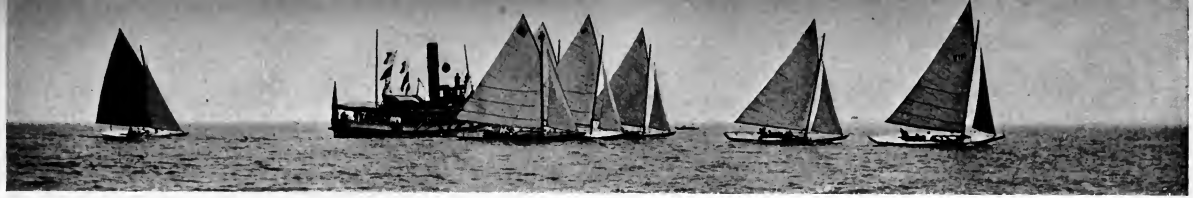
YEARS ago a fleet of yachts was started in a race from their anchors, when it was necessary to weigh anchor, hoist the headsails, and depart. This way of starting cut out all skill in maneuvering, and it came down to the crew who were able to get their craft under sail first.

The time start is now used among the larger racing classes, that is, the preparatory signal is fired at a certain hour, and from then the yachts are under the racing rules. Five minutes after this signal the starting signal is given, and the yachts can start any time after, within three or five minutes, as the case may be. Their time is taken as they cross, up to the three or five minute signal, which is the handicap gun, and after this signal they are handicapped. This kind of start calls for

jockeying and skill, and among the larger yachts, which are slow to turn and act as compared with the smaller classes, seems to be the best sort of send-away.

The flying start, however, is the most exciting, as your time is taken from the send-away gun, there being no allowed time to start in, but it means handicap if you do not get away on gun-fire. This start is used all over the country among the smaller boats and certainly is by far the best.

If a time start was given for the smaller classes it would be next to impossible to get the starting time correct on each boat on account of their numbers; and if the boats were sailing in restricted classes, and boat for boat, that is, no time allowance, it would mean complicated figuring, thus making it impossible in many cases to tell who had won until the "times" had all been figured out. Such a finish is decidedly unsatisfactory.



Start of a Sonder Class trial race in 1907. Third boat from right-hand end of picture has best of it, as she is to windward, with her wind clear and actually ahead

Start, Sonder Class trial race, 1906. Note boat bearing away, having reached flag mark too soon (before gun fire)

Just after a start in one of the International races with Germany in 1906. Leading German boat bearing away to recross, having gone over line before gun fire. The ensigns at the peak designate the boats

CHAPTER V

MANEUVERING FOR POSITION AT START

THE position that a yacht is in at the start sometimes is important enough in itself to decide the race. Take for instance, a fleet of ten or fifteen knockabouts, all practically alike, varying only in small details, your boat being the best to windward, but only slightly so. Your start is bad on account of getting to the line too soon and the boats coming along behind you take the windward berth, as you have to bear away in order not to cross too soon. The gun goes and you are covered up, your wind spoiled by a number of boats. It then becomes necessary to beat them out, you being at a disadvantage to begin with. You finally succeed in passing all but one boat; she rounds the outer mark ahead, and the next leg is a very free run before the wind or a

reach home to the finish line; but you cannot catch her, as she is slightly faster than your boat going off the wind. If, however, you had got away clear at the start you would not have been blocked by the slow boats on the windward leg, and you would have worked out a winning lead at the outer mark. This is merely an example to show what happens time and again when the race is lost on account of a poor start.

Be sure your watch is running all right, and test it with some of the guns that are fired for the larger classes. Then watch your fleet, see what they are going to do, and which end of the line has the advantage if there is any. If there is none take the starboard tack end, as then you will hold the right of way over the fleet at the other end.

Try your boat over an imaginary distance to the line and time her carefully, then you will know approximately how long it will take to sail that distance, and will save getting to the line too soon at the start, thereby

losing your advantage. It is always a good rule to be just ahead of your fleet and be pushed over the line, so to speak.

If you think you are going to reach the line too soon jibe your boat, if there is room, or give her the sheets; then by pulling the mainsail flat in or letting it out you will kill her headway. Be on the alert and take some chances if it is necessary to get out of a bad pocket.

If you need room on the mark to keep from striking it, or if some other boat is going to strike you if you leave the right-of-way, give your adversary plenty of warning by calling "Right-of-way" before it is too late to avoid a catastrophe. Be polite in your requests, but take your rights, because if you give in once you will be expected to again. Use, however, common sense, and if your chances of winning are pretty good, let the others mix it up and come in collision, but keep clear of it yourself, sailing out and around the trouble and get away clear with a good lead before they get separated and started again.

If the first leg is a close or broad reach to the first mark, get to the windward end of the line five to fifteen seconds too soon, with your sails trimmed flat in and with little headway. Then sail down the line, dodging anybody coming to it closehauled with the right-of-way, and swing across the line on gun-fire, having started or freed your sheets to get headway a second before, because it is essential to have your wind clear on a reaching start. If some of the boats to windward get into a luffing match, let them go, as the shortest distance to a mark is a straight line. If the wind is shifty, keep somebody on each sheet, trimming and freeing as the wind varies its direction.

There are, of course, hundreds of combinations in starting, but it is impossible to attempt to cover them all.

CHAPTER VI

FIRST LEG TO LEEWARD OR WINDWARD

THE position of the boat on the starting line depends upon the direction of the wind, whether it is a beat or a run to the first mark. If it is a beat, and in a strong breeze, get everything set up taut, and especially the peak of the mainsail. Have everything tied down on deck and the boat put in good shape. Lie on top of the fleet as much as possible before starting so that you will have the weather berth when you are off and be in the best position for the windward leg.

If it be a run before the wind, get your spinnaker pole and lay it on the side of the deck on which you are going to set it. The spinnaker should be coiled on deck and the head attached to the halliard and hoisted, if it is going to be set up in stops and not set flying.

If you see that the boats are bunching at one end of the line go to the other and keep clear of the fleet. Let them bother each other and do the luffing and blanketing. Sail, if necessary, in a slight circle to avoid them and do not set or break out your spinnaker if it is blowing hard until you have your position fairly well assured. A boat is a much handier thing to maneuver, especially in a fresh breeze when luffing is necessary, without the addition of a kite blowing all over the lot. Then, when the proper time comes, set your spinnaker quickly and fill away for your mark. If an island or any land comes in your way for a straight course, cut in as close as possible, for you can often gain a little by so doing.

If you get away at the weather end of the line, put your spinnaker on directly and keep at first a little to the windward of your outer mark, so none of the stern boats can spoil your wind by blanketing you.

A start before the wind. Three sister boats leading

A start to windward in a breeze. Note No. 12 lifting well out on a sea

Unrestricted 21-foot water line scow, exaggerated form. Spinnaker and main boom spreading almost 100 feet
Note size of figures on deck

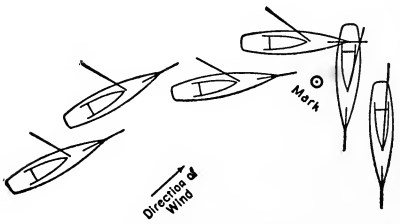
CHAPTER VII

ROUNDING MARKS

THERE are many effective ways of rounding marks, depending on circumstances; the direction of the next leg in regard to the wind, whether to windward or to leeward; the question whether you are overlapped by another boat or you have an overlap yourself. I might explain here that an overlap is established when an overtaking yacht has no longer a free choice on which side she will pass, and continues to exist as long as the leeward yacht, by luffing, or the weather yacht, by bearing away, is in danger of fouling.

When you are in the lead and you come to the mark, the next boat having a slight overlap, it is necessary by the rules of racing to give him room to round without fouling the buoy. Bear away as you approach the buoy

and then swing sharp when abreast of it, giving the other boat just room for her bow between you and the mark. Point your boat as high as possible with your sails trimmed flat. You are to leeward, but she cannot pass you as you are throwing back wind into her sails and she either has to tack or come about; and by far the best thing for her to do, seeing she cannot cover you at the turn, is to come about around the mark, thereby getting her wind clear. Tacking around a mark is an excellent thing to do, as it allows your sheet-man to pin the sails down where you want them without the strain of hauling them when they are full.



Cut 1. Rounding a mark, to go to windward. 2d boat does not give 3d boat room around the mark, and so fouls her, as 3d boat had an overlap on approaching it. 1st boat has given 2d boat room around the mark and is placed on the lee bow of 2d boat in an excellent position to back wind her, quickly drawing out ahead on account of it. 6th boat is overlapping 5th boat, so 5th boat will be forced to give room to No. 6, as they round.

When running to a mark with spinnaker set, keep your sail on her as long as you dare, but be sure to have time enough to take it in and get things ready for the windward leg, as that is what will tell in the end. When rounding a mark, the next leg being before the wind, or reaching, cut it as close as possible on all sides, and get your sails across the boat in a hurry. If it means a jibe of the mainsail, start to take in on the mainsheet before you get to the mark; this will allow you to shave it closer than if you jibed at the last moment.

When approaching a mark coming to windward, keep your eye on it and be sure not to overstand it, as this means a loss. Get your spinnaker ready on the last hitch to windward; if the next leg is before the wind, and when rounding, you give her the mainsheet and get a knock-down when you fill away, be sure and see that the mainsail does not foul the flag. Then keep slightly to windward of your course while setting the spinnaker so that you shall not be blanketed by

the stern boats. If on the other hand you happen to be one of the stern boats swing out to windward and bother the leader all you can. It will worry him if you do not actually cut his wind, and if you do happen to spoil it, unless he is a great deal faster, you will soon close in on him and have an excellent chance of getting past him.

CHAPTER VIII

ALLOWANCES FOR TIDE OR CURRENT — SHOAL SPOTS

IN a great many localities, especially on salt water, the tide or current runs strong enough to be carefully figured on in sailing a race. You should always know whether the tide is coming or going, and in what general direction it runs on various parts of the course. If the wind is light it may make a great difference to the boat if she is held slightly high of the course to offset the tide or current. You should also use judgment in rounding marks and know how the current runs past them, so that you shall not be set down on the marks and foul them, being unable to get clear at the last moment.

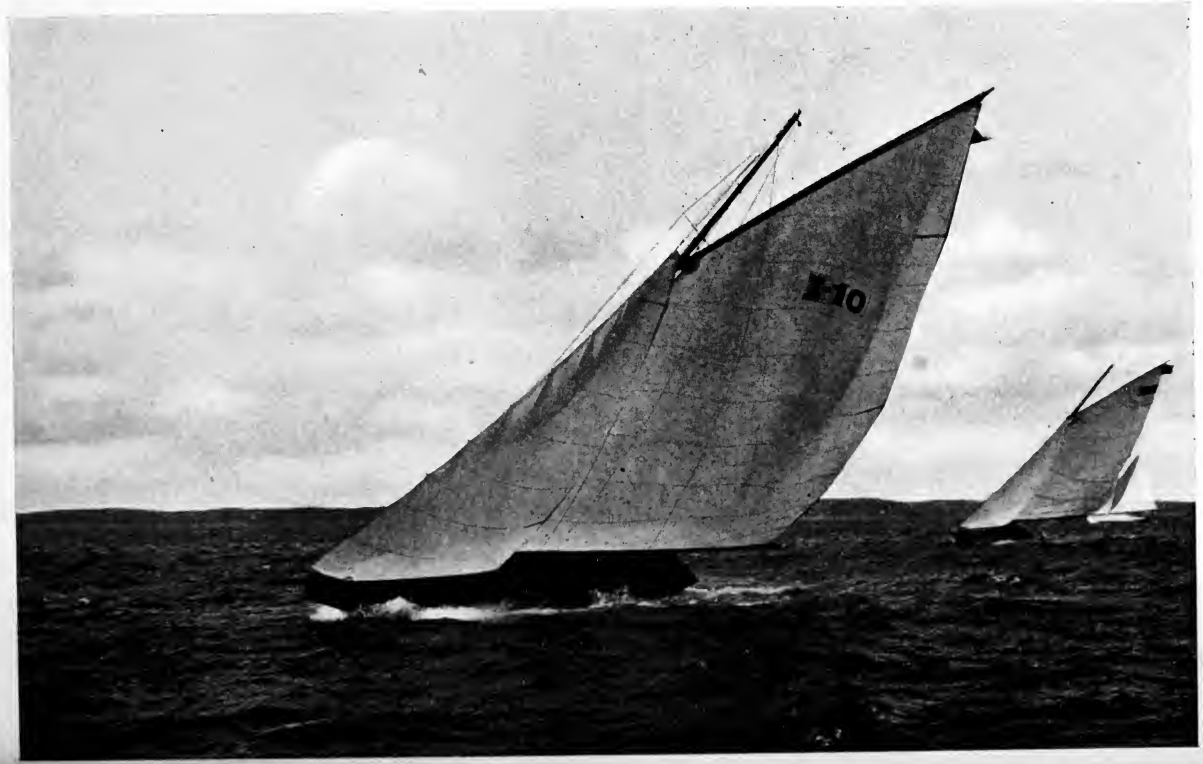
In river and lake sailing there is usually a back eddy close to shore, or under certain points of land, and these favorable spots

should be worked, as a head current retards the progress of a boat very materially. I have had experience in river and lake sailing where two rivers meet; the current in one being very strong and yet twenty feet further off; in the other there is practically still water, the dividing line being marked by shoal water and a distinct difference in the color of the water, one being brown and the other green. Use one current in beating to windward and the other in returning before the wind.

Many races are won by reason of the skipper knowing where the shoal spots lie and avoiding them, as the boat slows up in shoal water; also by his knowing how to work the shore with its eddies and favorable slants of wind, and where the current or tide will favor him the greatest when sailing in a certain direction. If you are drifting along over a finish line, as is often the case, going directly with the current, it sometimes is an excellent scheme to slightly turn your

Correct heel for windward work, lee rail just awash

Broad reach in a good breeze, showing clean lifting bow wave


K-10

boat across the current in order to bring the flat side of your fin or centerboard against the strength of push of the current, this offering more resistance than through the sharp front and rear edge of the fin.

If you are uncertain about the direction of tide or current it is a good rule to keep slightly to windward of the course, having a little to come and go on at all times.

In reaching across a current that is fast setting you to windward, keep well to leeward of your mark in order to sail a straight line. Remember that the general tendency of a man setting out to windward, sailing a boat on a reach, is to keep the bow of the boat on the mark, where in reality the boat is sailing high of her course going through an arc of a circle.

To tell exactly how you are sailing get directly amidships and look along over your bow.

CHAPTER IX

BEATING TO WINDWARD

SAILING to windward or beating to windward is the one special condition of sailing that requires skill to get good results.

The pressure of the sail driving ahead is very slight; you are going as near dead against the wind as is possible, so the pressure against your boat of wind and water is greater than under any other conditions. Here skill in handling, a smooth surface, well setting sails, little windage, all count for more than in any other point of sailing. You must not trim the sails too flat or allow them to be off too far, as either extreme will kill the boat's windward qualities. Remember, also, not to trim your sails exactly like some other boat, as it will not necessarily work. Every boat needs to be trimmed and balanced to suit her-

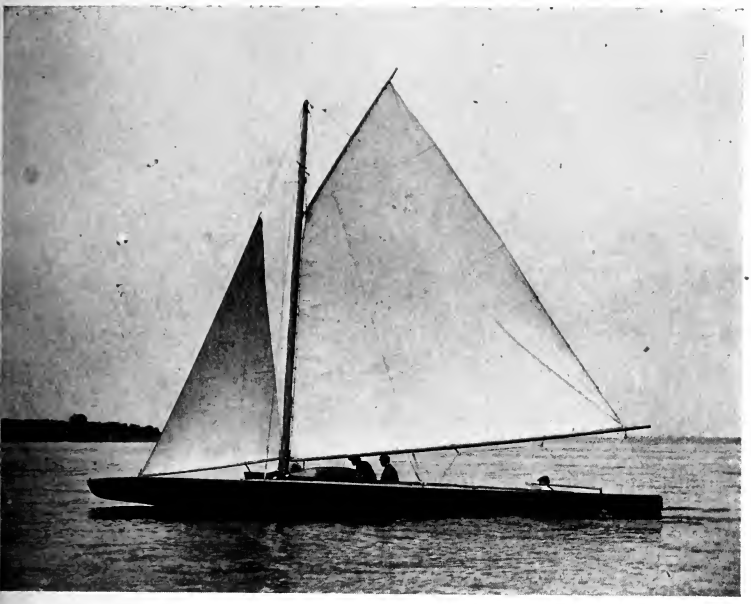
self, the sails or model being different in different boats.

The peak of the mainsail must be well set up so the gaff shall not flow off at too great an angle and so lose the drive. By hoisting the peak you throw a nice bird's wing curve into the forward part of the sail, thus increasing the driving power.

Always choose a comfortable position where you can watch your sails and boat. Keep her moving ahead at all costs; there is nothing gained by pointing her higher than she will comfortably go, and thereby lose headway. Keep the boat always on her feet and meet the knock-down puffs half way by luffing and slightly spilling the wind from the sails. It is a good idea to keep the mainsail slightly lifting or fluttering in by the throat, if you have enough wind to give a fair move. In a seaway it is usually better to give her slightly more of a full, in order to better carry your headway through the jump.

To be sure of the best driving mainsail for

all conditions in windward work, it is necessary to have several sails. A very full one for light weather, with good lift and play to the boom. Have a fairly flat one for a breeze, so that you may get the benefit of the forward part to help keep the boat's head off when going to windward. This eases up on the rudder and the tendency to come up into the wind is less with the forward part drawing. The perfect balance of the yacht to windward is very essential to speed. The rudder should trail out directly astern and should be used simply to turn, and not to do the work that the sails should do, namely, keep her from coming up into the wind or running off to leeward.



Windward side, showing long straight sailing lines and port rudder
Weather bilge-board hoisted

Note position of main boom for light weather work

On a close reach at good speed. Easy formed scow Sonder boat. First choice for the American team of 1906. A very fast boat in light weather. Note especially smooth wake

CHAPTER X

REACHING

REACHING, for the modern small racing boat, is the fastest point of sailing in most conditions. When running before the wind you cannot go faster than the wind is blowing; while in beating to windward the boat is laced down and does not have the free action that she shows when the sheets are well started and the sails are lifting, so getting all the benefit of the drive.

Reaching may be either broad or close. By broad, I mean when the wind is coming over the weather side further aft than a-beam; by close, I mean when the wind comes forward of the beam and you can still fetch your mark without going to windward.

Reaching is a condition of sailing where model counts a good deal, although not nearly so much as when going to windward.

Any boat can reach, as there is nothing for the skipper to do except station his crew in the best possible positions and keep his sails just right with every inch of canvas drawing. If it is not blowing too hard, it is advisable not to cleat your sheets, but put a man on each one. Have him watch the sails and be sure that they are always full of wind.

On a reaching start there is always bound to be a lot of luffing and bearing away to be done and the craft is never steady on her course. If the wind is very heavy and there is also a heavy sea running, the modern boat is very apt to yaw and twist and be very uneasy and hard on her helm, twisting and turning on her narrow fin. The bow wave is usually very large and has a tendency to make the boat broach to. When she has a coamer under her stern quarter, pay her off slightly in order to let her run on the crest as far as possible, which she will do at great speed. Do not attempt to check every slight move or twist caused by the sea, as it is impossible,

and the rudder will stop her far more, turning from one side to the other, than though you let her alone.

Of course, if there be a twist of any magnitude, take it early and check her, but as she swings back into her course straighten the helm out slowly so as not to send her beyond her true course, and so make it necessary to put the helm hard down.

In other words, feel your boat and help her; do not retard her by unnecessary turning of the rudder.

CHAPTER XI

RUNNING BEFORE THE WIND

RUNNING before the wind is the point of sailing that is usually most monotonous. As the boat is traveling with the wind, you cannot feel a draft and it is often very warm. Light sails are carried before the wind, such as spinnaker and balloon jib. The mainsail should be freed out until it touches the shrouds and can go no further. It is sometimes impossible to free it as far as this, if the wind is heavy, as the jaws of the gaff are apt to split on account of the gaff swinging well forward of the mast with the jaw prying against the mast and shrouds.

The spinnaker is set on the opposite side to the mainsail, and, if the wind is dead astern, is guyed well aft; that is, the pole is set perpendicular to the side of the boat, held by the

guy attached to its outer end and cleated on the stern of the boat. The spinnaker sheet is carried around the mast and outside the leeward shroud and led aft. This sheet is either freed or hauled down, as the case may be, allowing the spinnaker to balloon up or flatten down. If allowed to flow forward the wind from the leech will spill into the balloon jib and thus you will get some little pull from that sail. If the wind is unsettled, hauling to the quarter and aft again, it is an excellent scheme to have a man on the spinnaker guy to let it out and take it in at a moment's notice, so that the sail will never be lifting but always a hard full.

The boat before the wind is in an upright position and this often means a great bow wave is piling up under the long flat forward overhang and lifting the craft off her ordinary sailing lines. In this case, it is a good idea to carry a man well forward in order to hold her head down and so keep her on her lines. In the "V" shaped section craft, this is usually

wrong, as she cuts the water, throwing it to either side, and having the tendency to bury forward when running down hill on a sea. In this case keep your men well aft in order to keep her bow out and the deck clear of solid water forward.

If you are sailing the long flat scow before the wind, keep your crew on the lee rail, in order to heel her as far as possible, especially in light weather, as when upright, the flat form is a great hindrance to speed for many reasons.

It is also a good plan, if your mainsail, when hoisted high for windward work, shows wrinkles, to slack off the peak halliard a trifle, thus smoothing out the sail and getting thereby a more effective surface.

If in a roll of a sea and in light weather the jib is slatting back and forth, knocking against the spinnaker and thus spoiling its wind, always lower the jib and get rid of it as it is doing much more harm than good. It is very essential that the spinnaker and main-

sail shall not slacken any more than absolutely necessary.

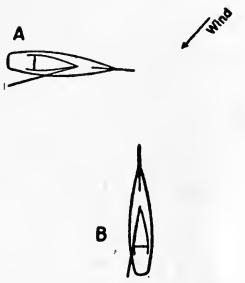
If the weight of the mainsheet is too great for the boom and sail to hold out, and the sheet drags in the water, place one of the crew on the boom, in by the mast, thus holding it in position, or else unwreathe your mainsheet, excepting one part, thus cutting out the weight of the rope.

CHAPTER XII

WHEN TWO BOATS ARE CONVERGING

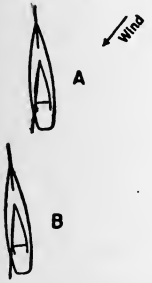
ONE of the most common occurrences during a race, and perhaps one of the most important incidents, which calls for the nicest handling is when two boats are coming together, or converging, either on different tacks or on the same tack, or when one boat (the windward one) is not able to hold as high a course as the leeward one, although going through the water at the same rate of speed, or a little faster. Of course the right-of-way here plays an all-important part; the craft with the starboard tack (both boats sailing to windward) has the right-of-way over the craft on the port tack. The question then arises — if boat "A" (see diagram No. 2), holding the port tack, can get across boat "B's" bow, holding the starboard tack with right-of-way, if "A" can cross "B," "A"

should do so by all means and tack immediately to windward and ahead of "B," thereby forcing "B" to tack or sail along with his wind badly cut up. "B" on the other hand should swing about on the other tack when "A" swings to block him, thereby losing nothing.



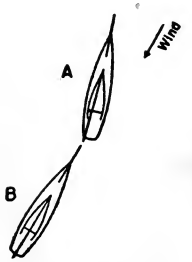
Cut 2. A about to cross B on the port tack.

Take another case. If "A," on the port tack, cannot cross "B's" bow without being fouled, "A" should tack under "B's" bow just to leeward and ahead, thereby giving "B" a dose of back wind that will force him to come about or lose distance. This latter trick should be executed when in exactly the right position, because when tacking "A" loses headway and "B" may slightly luff and then bear down on "A," finally covering him and

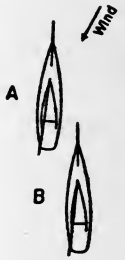


Cut 3. A tacks just to windward and ahead of B, thus cutting B's wind.

passing to windward, badly spoiling "B's" wind and dropping him well astern before he can get his wind clear again. "B," however, cannot drive "A" off to leeward, if you are sailing under the rules of the leeward boat having the right-of-way when two boats are converging on the same tack for the reason of holding a better wind, but can pass close to "A" without "A" being able to touch "B."



CUT 4. B swinging to port in order to get her wind clear.



CUT 5. A has tacked under B's lee bow, having been unable to cross B's bow, as B holds the starboard tack and right-of-way. A is now in an excellent position to backwind B and so force B to tack to port.

When two boats are sailing on a reach, "A" catching "B," "B" can luff until "A" has an overlap; then "B" must hold his course and should not change it, believing that he holds the right-of-way, being the leeward boat.

The rule used by some clubs is that the

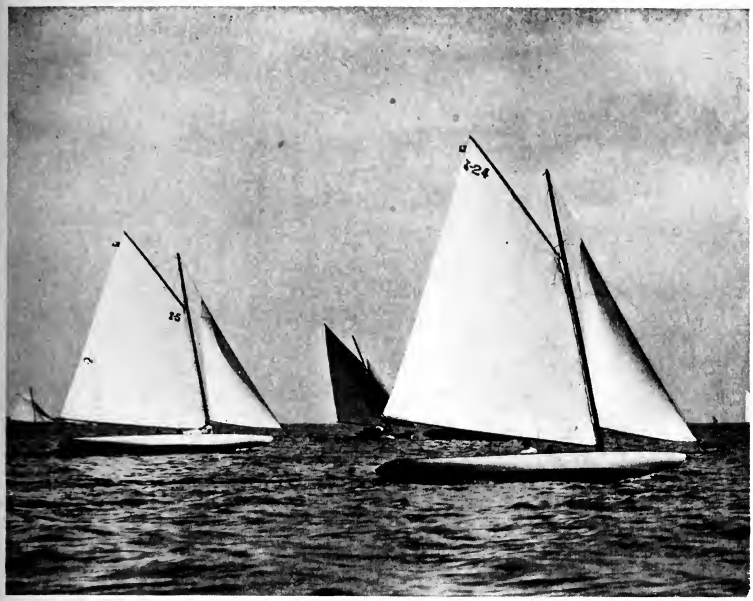
leeward boat shall have the right-of-way over the windward boat on account of holding a better wind, and being unable to tack when close aboard the other boat. The only chance then of not striking is to bear away. This is a much better rule. The other rule is that the windward boat has the right-of-way over the leeward, but has got to hold her course when passing another boat.

CHAPTER XIII

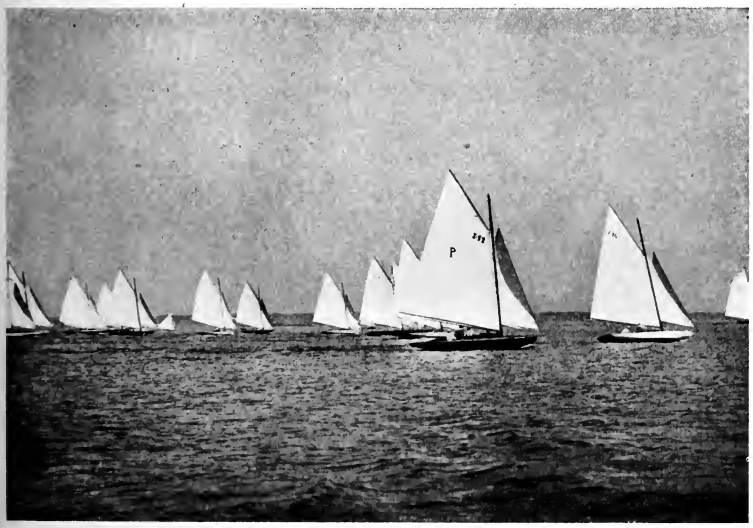
TWO BOATS APPROACHING A MARK

A GREAT many of the fouls and protests that are handed into the Regatta Committee to decide are caused when two boats are approaching a mark, or actually rounding it. Somebody had the right-of-way, and the question arises, Who was it?

This question in a race is usually a very important one, because the yacht that gets around first gains a very great advantage over her competitor, in that it is necessary for the other boat to pass her in order to beat her home. Passing a boat on a reach is an exceptionally difficult matter, if the boats are equally fast. To windward it is also difficult, as the first boat around can cover the other one. Before the wind, however, the second boat around the mark can cover the first, if she is close enough to take her wind.



Just after the start in close quarters. No. 24 in weather berth and in leading position. A good example of the 18-foot knockabouts



Start of Massachusetts Bay 18-foot knockabout class. First leg a broad reach, showing how boats spread out on a start of this sort

Fleet of spectators running back to Marblehead after one of the Sonder Class races with Germany in 1906

When two boats are coming to a mark for the purpose of rounding, on different tacks, the boat having the right-of-way on the starboard tack should make it as bad for the other as possible, forcing him to tack, thus carrying him past the mark, if he tacks under his bow, or else forcing him to go under his stern.

If the boats are approaching a mark both on the starboard tack, the windward boat should be careful to sail on that tack far enough so as to be sure to easily bring the mark on the next tack, and stay close enough to the leeward boat so that she cannot tack to port and go under your stern with her wind clear.

When two boats are coming to a mark, sailing before the wind with spinnaker set, then the stern boat should so figure as not to pass the first one too soon, and so lose the advantage of being the inside boat on the turn, but should hold back until the right moment and then forge ahead and abreast

of the other, on the inside, thereby cutting in on the mark and being the weather boat after the turn, with the other one to leeward and behind. Be sure to get the spinnaker off in time to have things snug when you round, especially if it is blowing hard, so that the crew can attend to the boat to windward, and get her going properly, without delay.

When two boats are reaching for a mark, and the stern boat has an overlap of, say the bowsprit, the first boat has to give her room around the mark. Do not give more room than is necessary while you round slightly in the lead and to leeward, squeezing your boat as high as possible in order to backwind the one to windward and astern of you. This can very often be done and the stern boat will be forced to tack away from you.

When you are approaching or rounding a mark, carefully figure out what certain moves will result in when once around.

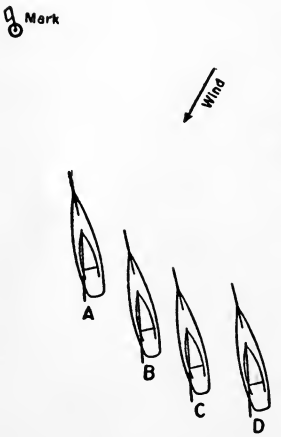
CHAPTER XIV

MANY BOATS APPROACHING A MARK FOR THE PURPOSE OF ROUNDING

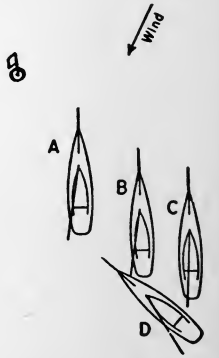
THERE are a thousand different combinations which a fleet of from three to twelve boats could assume when rounding a mark well bunched. I will point out certain cases and explain these.

Saying a fleet of four boats, as often happens, is approaching a mark for the purpose of rounding, all going to windward on the starboard tack; the leeward boat is ahead and each following boat overlaps the one nearest him to leeward; the next leg is a beam or quartering run. Of course, the boat "D," being farthest to windward, has the freest course and can sail through the water faster than the others; she has the greatest distance to go, however, and cannot get around before "A" (see diagram 6), "D" having to sail on the out-

side of the circle. "A" having the right-of-way, the other boats have to give "A" room to round the mark without crowding her on to it. "D" sees that after rounding she will be to leeward, and behind in an impossible position to do anything and, therefore, must in some way get to weather of the other boats, after the round, not being far enough ahead to kill them by cutting their wind as they are approaching the mark. "D" continues in her position until well up to the mark, then slows up by easing her sheets, or luffing sharply, and bears off again

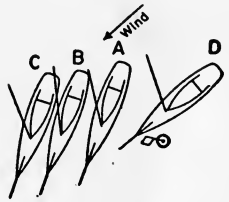


Cut 6. Approaching the windward mark, all overlapping one another.



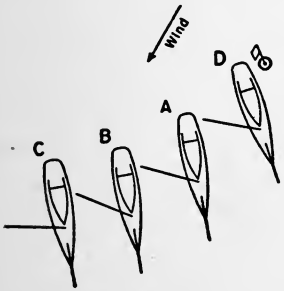
Cut 7. D bearing away in an attempt to cut in on the turn as A, B, and C slightly luff each other out to windward.

immediately when she can cross the sterns of "B" and "C," which she does, and with her increased speed off the wind puts her bowsprit just to leeward of "A," between "A" and the mark, thus making "A" give "D" room at the mark to round in. (See diagram 8.)



CUT 8. D cuts in to weather position on the turn and the other boats have to give her room on the mark.

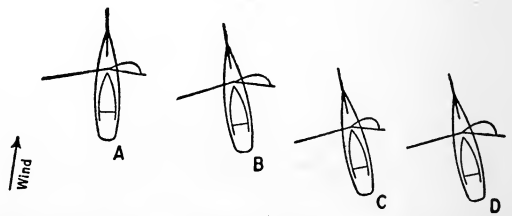
"D" is then sailing on the small arc of the circle and jibes with the others, being then in the weather position and abreast the others, if not ahead. (See diagram 9.)



CUT 9. D in windward position for the run to the finish line.

This same maneuver can be applied to a fleet running before the wind where the outside boat is in a bad position on the round. She has been the weather boat all the way down the first leg before the wind, but has been unable

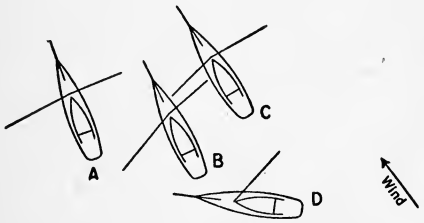
to gain any lead as her wind is taken the minute she forges ahead. (See diagram 10.) As "A," the leeward boat, gets well down to the mark before she jibes, "D" takes her spinnaker aboard, jibes her mainsail quickly, and with a rush crosses the sterns of "B"



CUT 10. Approaching the mark, before the wind. D in a bad position for the turn.

and "C," and, placing her bowsprit between "A" and the mark, forces her way into the weather position on the round. (See diagram 11.) This is made possible because "D" is able to run across the wind faster than before it, and is also helped by the

delay of the other boats taking in their spinnakers and jibing their mainsails. "B" and "C" may try to follow suit, but it is too late, as "D" has taken their wind and is to

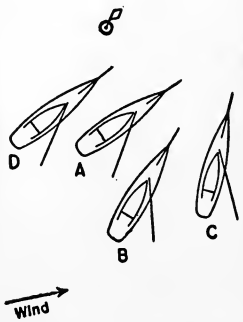


Cut 11. D jibes mainsail to starboard before the other boats and just before reaching the mark, reaches across their sterns for the inside position at the turn.

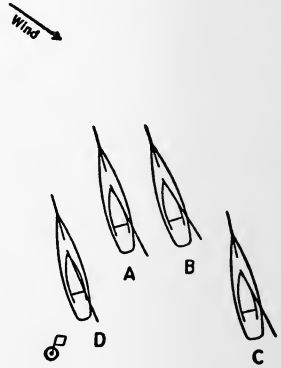
windward and ahead. (See diagrams 12 and 13.) The best thing for "B" and "C" to do is to keep clear of the fleet by taking a large sweep around, especially if the next leg is a reach, thus getting their wind clear. If the leg is to windward, they are free to come about on the starboard tack when they wish, not being tangled up with the weather boats,

and having their wind clear, which is a great thing for windward work.

When the fleet is running free, approaching a guide mark, which only means a slight



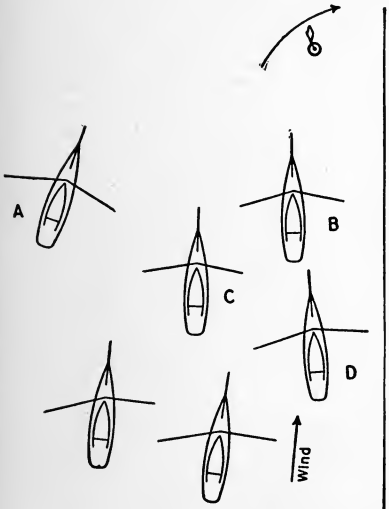
Cut 12. All the boats have jibed and taken in spinnakers. D has gained the best position for the turn, being windward boat and on the inside.



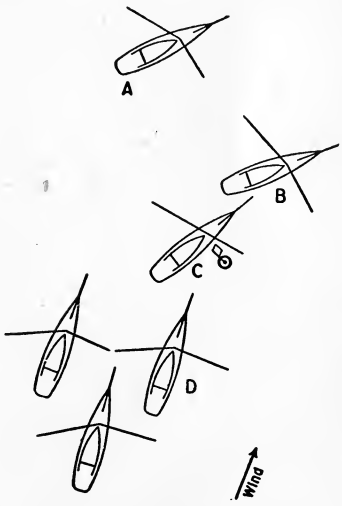
Cut 13. A close reach, D to windward, C bearing away for the mark in order to get her wind clear of the other three boats.

change in course, say from dead before the wind to a little more than wind on the quarter, but still free enough for spinnakers (see diagram 14), "A" sees she cannot round ahead as she cannot get across the bows of "B," "C," and "D,"

so keeps well off the mark and does not mix up with the leaders, "B," "C," and "D," who, on the second they round, begin a luffing match, going well to weather



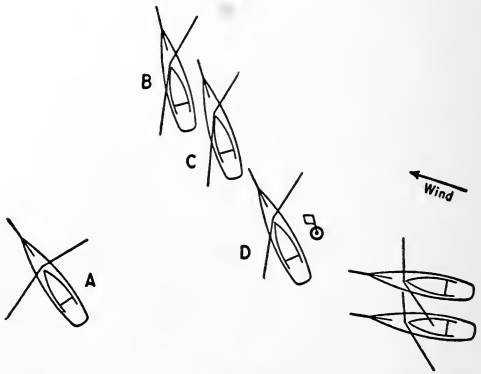
CUT 14. Approaching a guide mark before the wind. A in a bad position as they round and slightly change their course.



CUT 15. B and C rounding, holding high of their course in order to keep their wind clear. A keeping well away to leeward and heading for the mark.

of their course. (See diagrams 15 and 16.) Their spinnakers not drawing well, "A" should keep slightly to leeward so

to be sure to keep her round clear; then when "B," "C," and "D" square away, "A" will find herself well to the front and in an excellent position, as she can sail slightly across the wind, being to leeward,

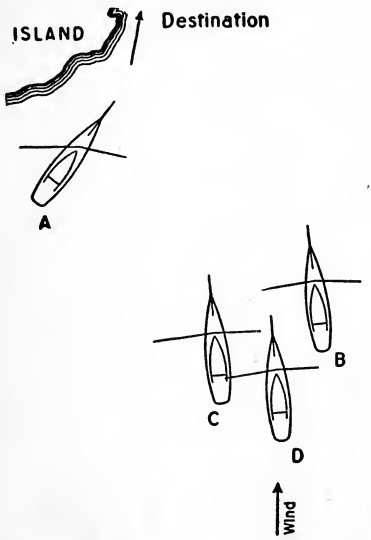


Cut 16. A luffing match between B, C, and D; A keeping clear by bearing away to leeward.

and make faster headway than "B," "C," and "D," as they will have to run dead before it to fetch their mark, and consequently slow up, bothering each other all the time. (See diagram 17.)

One thing must be remembered, make the

move that would land you ahead in the end, even if it is hard to do it in the beginning. This pays every time.



Cut 17. B, C, and D bearing away for the mark. A cutting in ahead keeping close to the island and having her wind slightly over her quarter, thereby sailing faster through the water and also a shorter distance to the mark.

CHAPTER XV

THE TEAM RACE

YACHT racing to-day is divided mainly into three kinds of races — the Match Race, Team Race, and Fleet Race.

The Fleet Race is where each boat is racing for herself, this being the most common kind, but for scientific calculating and sport the Team Race leads, and if the Match Race be close, it should have second position in importance.

I will take the Team Race first. This race consists of from two boats on a side upwards to any number, matched against each other, the scoring being done usually by the percentage table, or by allowing a certain sum for a first, second, third, and fourth place, and so on. I think the table preferable. Take, for instance, six boats, three on a Team. First place would be worth 100, second 83.3, third 66.7, fourth 50, fifth 33.3, sixth 16.7.

There are these various combinations of positions that will win. First place and second will win even if the third boat does not finish and gets zero. First, third, and sixth places will win over second, fourth, and fifth, and so on; the combinations of the various positions at the finish making the race doubly interesting as the leaders can help their Team mates by various maneuvers, blanketing, etc.

I will give two or three actual instances where maneuver and skill helped to win. In a series of races that took place three years ago, with three boats on a side, there happened to be one centerboarder on one of the teams (call it team "A," and call the other team "B") that was greatly superior to her team mates and also to the boats comprising team "B," in a good breeze. The race was a triangle twice around, distance 12 knots. At the end of the first round she was well ahead of the fleet, with the other team in second, third, and fourth positions, giving them, if they could hold these positions, the race on

percentage. After rounding the home mark, instead of starting and sailing as fast as possible to the weather mark on the second round, she doubled on her course and sailed back to meet the first boat in the other fleet (team "B"). When she reached the leader of team "B" she tacked to windward of her and completely spoiled her wind, slowing her up tremendously. Meanwhile the other boats in team "B" caught up with the leaders and became entangled with each other and the leader in team "A." While this was going on, team "A" boats in the rear picked up to the leaders and the entire fleet went around the mark in a bunch. Then the centerboarder, first mentioned in team "A," covered the leader in team "B," going to windward, staying close aboard her, and spoiling the "B" boat completely. Meanwhile the other team "A" boats had gone into first and fourth positions. Seeing this, the centerboarder left the old leader of team "B" and started to catch and cover the new

leader of team "B," then sailing second. This she accomplished, and the boats in team "A" rounded in first, second, and sixth positions, holding these positions to the finish, and thus scoring a win.

Another very interesting incident which took place during another series of races between different clubs was when on the run home, before the wind with spinnakers set (calling the boats teams "A" and "B," and the Boats X, Y, and Z in team "A," and 1, 2, and 3 in team "B") team "A" was in first, third, and sixth positions; team "B" in second, fourth, and fifth places, great distances separating each boat. Boat X, the leader of the fleet and in team "A," finished. Boat 1, in second place in the fleet and leading team "B," on seeing Boat X finish, took in her spinnaker a mile from the line, and waited for Boat Y, which was sailing in third place, being second boat in team "A." When they came together Boat 1 crossed Boat Y's stern and set her spinnaker, taking

all her wind and completely killing her, and at the same time 1 threw a bucket overboard, attached to a long rope, in turn killing her own headway; thus she held Y and herself back. No. 2 in team "B" soon picked up and passed the pair, going into second position, then 1 pulled in her bucket and let Y go, only covering her at intervals, so she should not get away again. When close to the line 1 covered Y and passed her to windward, intending to get the jump and shoot by into third place, thereby getting a second, third, and fifth, and so winning the race. It was a nicely thought out scheme, but unfortunately for team "B," Y of team "A" got a heavy sea under her stern, and in a hard puff ran the last 200 feet on the crest of a sea, passing both boats in team "B" and actually finishing second, so giving the race to team "A."

There are various other tricks and combinations, when properly executed, that will change the entire outcome, such as carrying

a fast boat of the other team out into the worst water and wind; blocking her regardless of what happens to yourself; working the start so that each one of the other team shall be covered by your team; tacking at the right time to spoil the other boats; leaving your position after rounding marks to spoil the leaders of the other team; sailing to help your team mates by keeping astern, especially if faster than the others, in order to block the leaders of the other team, but above all, have the winning combinations worked out beforehand and written on the deck where you can always find them. Also, get together the night before the race and scheme out your plan of attack, considering all possible combinations.

CHAPTER XVI

THE MATCH RACE

THE Match Race is the type of race now in use for the America's Cup, where there is only one boat on a side, sailing a series of three out of five races for a win.

This kind of racing brings out all the skill in handling, and errors are easily seen when made, as there is no other boat to help along, as in the Team Race, and there is only one boat to defeat and look out for. As the saying goes, get between your competitor and the mark, and stay there if you can, and if you can do this you will win.

I will tell about a certain race that actually took place between two 21-foot raceabouts, best three out of five for a large stake. We will call the boats "A" and "B." "A" was faster in light weather, "B" in moderate

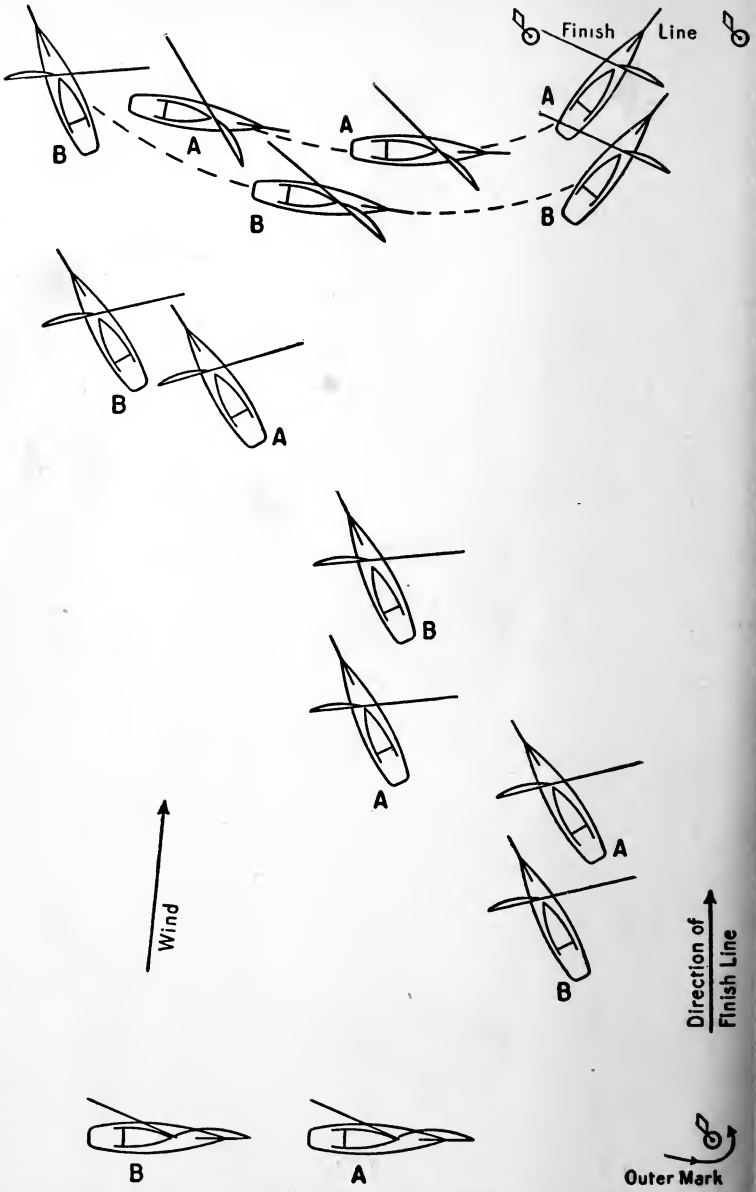
weather, and it was a close match in a heavy breeze.

The first race was sailed in a moderate wind, "B's" weather, and the incident that I wish to recall happened in that race. The course was to windward first, then a reach and a run with spinnakers home. "A" was first at the windward mark, "B" being one minute and thirty seconds astern. On the second leg "B" cut "A's" lead down to twenty seconds and "B" could outrun "A" dead before the wind. When "A" rounded it was obvious that her wind would be spoiled by "B," so she luffed well out to weather, and when "B" rounded she followed suit. After ten minutes sailing it was only a matter of a few minutes more before "B" would pass "A." "A," however, kept her course well high of the home mark, and when "B" passed her to windward "A" quickly luffed up past "B's" stern. This forced "B" to luff and kept her from bearing away toward the home mark. "A" would luff across "B"

then try and go through her lee, all the time keeping "B" from heading off toward the finish line, for if she had "A" would have covered her and passed her. "A" kept up these tactics until they were both past the finish line, but a mile to one side of it. Then the right time had come. "A" attempted to run past "B" to leeward, quickly jibed her mainsail and pushed her spinnaker to starboard and headed for the line. "B" seeing this followed suit, but, of course, was directly under "A's" lee and so could do nothing. "A" passed her and pulled out a couple of lengths lead; "B" pulled up on the wind and crossed "A's" wake, attempting to luff out on "A's" weather quarter. "A" would not allow this and held again well to windward of the finish line, and the wind being about abeam, "B" could not pass "A" close to her on account of "A's" back-wind, and to pass "A" would necessitate sailing well to windward on a large arc of a circle. "A" could then hold her own as she

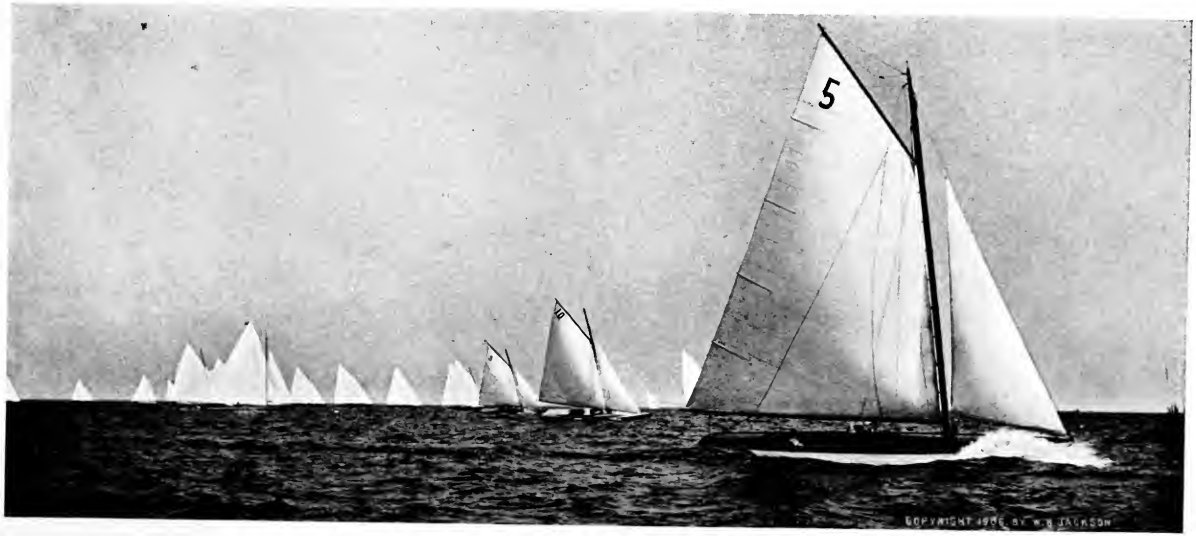
sailed on the small arc of a circle from where she had jibed to the finish line, forcing "B" to sail a larger arc in order to pass her, and consequently to sail a much longer distance. "A" crossed the line five seconds ahead of "B" simply because she had out-maneuvered "B," getting to the point she wanted when dead before the wind. This made "B" sail the longest distance home, and "B's" slight extra speed could not make up for this.

I consider this incident of extraordinary interest, because it is a good example of what can be done in a Match Race in the way of judgment and handling. (See diagram 18.)



Cut 18. A match race between two boats. A rounds outer mark ahead; B catches and passes a short time after rounding outer mark. They block each other before the wind. A jibes abreast the finish line and forces B to sail longest distance home, thereby winning.

An almost perfect start, the entire fleet on the starting line with starboard tacks, as the whistle blows
One of the starts in 1906 trial races



Just after the start during one of the Sonder Class trial races in 1906. Fleet just beginning to split up
Note bow wave on No. 5 as she jumps into a short sea

CHAPTER XVII

THE FLEET RACE

THE Fleet Race is the common type of race for a number of boats, each one for himself. There is possibly some luck in the finishes of the Fleet Race, as the crack boat may get away badly at the start, being covered by a quantity of the slower boats, and so being unable to get clear of the slow ones until it is too late to win; one of the faster boats by that time having worked out quite a safe lead. This is often the case, and in many respects the race is, for this reason, not so satisfactory.

As I mentioned in one of my earlier chapters, it is impossible for one boat to cover both sections; when in going to windward part go one way and part another hunting for flukes. If luck is against the best boat she will lose through no fault of her own, whereas

in the Match Race and Team Race you can stay with your competitors. This view is taken, of course, by the owner of the best boat in a Fleet Race, and the man with the slower boat wants to win some of the time, even if he does get a little lift by the wind favoring him.

Most of the general points that are possible to give in a work of this sort I have mentioned in previous chapters, so there is no use in speaking of them again here. I will say, however, that good judgment and careful attention to winds and tides will win in the long run over the man who is careless and by luck has fallen into first place now and then.

CHAPTER XVIII

SETTING AND TAKING IN LIGHT SAILS

WHEN the setting and taking in of light sails is done or handled in a clever, quick way, it is a matter of great satisfaction to the captain and crew, and sometimes is worth minutes to all concerned.

Say, for instance, the spinnaker is set instantly on rounding, the next boat is a few feet astern and is slow in getting her kite set; with the added sail you quickly draw away, as a spinnaker is a tremendous help off the wind. You can sometimes establish a lead that will be difficult to overcome. This is not so true of the balloon jib, as on a reach it simply takes the place of the working sail and the added area is not tremendous.

It is always a good idea to get your light sails out of their bags and neatly coiled up below

with the head up so that when you need them they are ready and clear for you without delay. In the smaller classes where the spinnaker booms are under fifteen feet long, it is unnecessary to have your sail set up in stops for hoisting and breaking out, as usually the thread is too strong, there is a twist in the sail, or something else happens to delay getting it spread to the wind; whereas if you hoist it flying, even if there is a twist in it, it will free itself, and there is at least some of the sail drawing from the start.

When setting the spinnaker, if stopped up the sail is hoisted, hooked on to the end of the boom, boom pushed out and hauled aft by the guy, cleated, and then broken out. If the spinnaker is set flying, hoist the sail more or less under the lee of the mainsail, cleat halliard, snap the tack on to the boom end, push your pole out without trimming the sheet, get it aft, and then trim the sheet. Be sure the pole is well up the mast so that the outer end shall point slightly downward. This will pre-

vent the sail skying upward when it first fills away.

The best method of taking the sail in, when the sail and sheet are allowed to go forward of the head stay, is to let go the guy completely, the sail coming forward, take pole off mast, unhook tack from end of pole and let it go; the sail then released goes in under the lee of the other sails and is lowered away and hauled in simultaneously by the sheet under the jib, and is easily smothered.

To take in the balloon jib, having already set the working sail to windward of it, start the halliard, slightly unhook the tack from the stem and let it go, then lower away and haul sail in by the sheet to leeward.

If the spinnaker cannot be carried forward of the headstay (and a great many rules restrict this) let go your spinnaker guy, taking the pole off the mast at the same time, unhook tack off end of pole and lower away, being careful not to get the sail caught in the jib snap hooks when lowering, and thus neces-

sitate lowering the jib to free it. Be sure to smother the sail with your arms and legs, so it shall not get overboard. There are many patent devices for setting and taking in the light sails, but I have found by experience that the best way in general is the manner here outlined.

CHAPTER XIX

REEFING

REEFING during a race, except for a squall, is not a possible thing to do among the modern boats and win. If you attempt to reef, somebody else will lug their sail, and you cannot make up for lost time unless it blows a hurricane and your opponents are completely overpowered. There are, however, many kinds of so-called patent reefs whereby pulling a line on either side of the boom, with long reef points attached to it, you can reef your sail. Then there is the roller boom that revolves, and the sail is rolled up on it to any extent you wish. I have seen all the various schemes in action and have tried out a great many, but the drawbacks and disadvantages are far in excess of any good you may derive from their use. Ordinary stops, or eyes,

and lace lines are better than anything yet discovered.

The reef should always be tied down before starting, remembering that it is much easier to shake out than tie in.

The quickest reef to shake out is the reef tied down with a lace line which goes under the sail on the boom, and through an eye in the sail round and round, the reef earings, of course, being of the ordinary sort. To shake out a reef of this sort, take a knife and cut the lace-line in two or three places along the boom, thereby freeing the entire sail in between its outer points; this being done, cut the earings on each end and hoist away on your sail. This entire work can be done in thirty seconds and the boat kept going along, practically losing nothing, whereas if the sail is tied down with the ordinary points it means that every point must be untied, and if you happen to find a square knot among them, it means cutting the point.

CHAPTER XX

ACCIDENTS TO SAILS, SPARS, RIGGING, OR CREW

THE accidents that happen to the racing boat should be few, if the boat is properly tuned up and everything tested out thoroughly and replaced when worn. However, no matter how careful a person may be, accidents are sure to happen once in awhile. If you tear a sail, say the mainsail, by having one of the reef points catch, keep on if you are leading until the sail goes; the chances are that it will not do anything more than worry you. If you tear a spinnaker all to pieces on the first round of a course, set another. Here the carrying of a second sail is invaluable.

If you lose a mast, there is nothing for it but to quit; also a boom or gaff. But two spinnaker poles should be carried in

important races, as they are very apt to be broken, being small and thrown around a great deal.

The rigging, if it is not a main shroud, or bobstay, can usually be repaired. For instance, if your headstay goes, and your mast still stands, take a piece of the anchor cable and tie to the wirestay with a square knot, then with one of your preventers, or extra halliards, set the mast forward and tie it to the stem or bowsprit. If this cannot be done, lead forward one of the halliards, both ends being tied down to the stem.

If you lose a jib or peak halliard, use the balloon jib halliard, or spinnaker halliard, if there is any chance of their standing the strain. Always carry extra blocks and tackles to replace anything of this sort.

If a main shroud goes, tack your boat immediately so as to bring the strain on the other; this will give you a chance to fix up the parted one. Tie a loop, if you can reach the upper broken end, and hook in a watch

tackle, hooking the other end into the chain plate, and set up.

If you lose a peak halliard block, set up on another halliard, and trust to luck the other block will carry the strain. If a throat halliard goes, hook in the spinnaker halliard and hoist away. Do not set up a single part too taut. If you break a tiller, and have not an oar on board to steer with, while you are mending it take out one of the floor boards, and if it is long enough, steer over the lee side with it; if it is short, lash it to your spinnaker boom jaws and steer with the pole.

If you lose a bowsprit, and have an eye on the stem head, hook your headstay in there temporarily, or on the bitts. If you have neither of these devices, pass a loop well down over the forward overhang, bringing the ends together at the center of the deck and hitch your headstay there. There are, of course, many other makeshift devices.

If one of your crew falls overboard, throw him a life-preserver, or whatever there is

within reach that will be of any use. Then tack and pick him up. Do not trust to somebody else to get him, no matter how good a swimmer he may be; get him aboard as soon as possible, as a life is of much more value than a win.

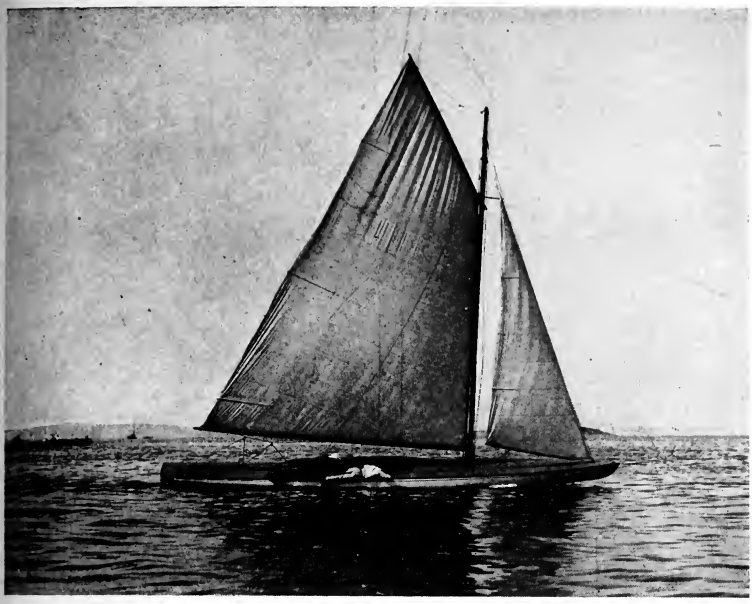
In case a squall comes up, watch the boats to windward of you and see how they are faring in it; have your halliards ready, so that you can lower away at the last moment. After you have felt it, and seen the magnitude of it, get your sails on her again if possible. Have your compass handy, so that in the rain and mist you will not lose your direction.

CHAPTER XXI

POSITIONS OF CREW DURING RACE

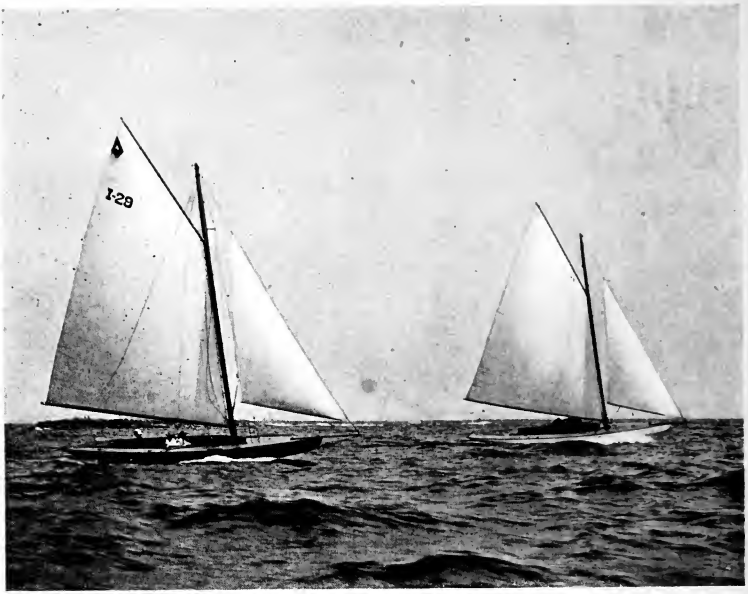
THE positions of the crew during the race is of no little importance. They should be stationed so that they can handle their respective sheets without moving about and should also be able to utilize their strength to the best possible advantage. Their positions in the cockpit, and on the windward and leeward rail, should be known, and, in ordinary conditions, the center of their weight should be just about over the center of buoyancy of the hull of the boat. If the wave under the bow is too great and lifts her head too much, shift your crew slightly forward to counterbalance this tendency. A good arrangement for three men is, one forward of the helmsman, handling both jib-sheets, and one aft, handling mainsheet and one preventer, the skipper taking the other.

If the skipper is on the windward rail, he should kneel down, not lie down, as then he could see nothing and would be in an uncomfortable position. The jibsheet-man just forward can lie down and out, and if the mainsheet-man just aft is not playing the mainsheet, he can lie down; otherwise have him sit up in a strong position, feet or knees braced against the coaming so as to be able to pull. In heavy conditions the position of the mainsail is of a great deal more importance than the windage of the crew. The jibsheet-man can lead his leeward sheet to windward and cleat it there; and *vice versa*, so he does not move off the rail until the boat tacks, in order to slack his jib, he also hauls it in from the weather rail. If the helmsman cannot comfortably reach his tiller from the weather rail, have a luffing stick made, consisting of a short, stout stick, say two feet long, so that he can hold it comfortably, with a leather strap to slip over the tiller head and so connect at right angles. This arrangement will allow



Exaggerated type of the narrow flat Sonder boat, showing position of crew on lee rail in order to heel boat to proper sailing angle in light weather

A flat formed, low ended Sonder Class boat, showing lifting tendency of bow wave even in very light weather



Going to windward in light weather. Weather boat running up on sea and blocking leeward one

Going to windward. Note correct position of man on weather rail

him to sit well out to weather where his weight will tell.

In a long, flat scow the crew need not bunch up in the center of the boat, but can string along on the rail, the boat being waterborne for such a great distance it will come easier on the construction to spread out the weight as much as possible. This will also give plenty of room for handling, and the crew will not be so apt to get in each other's way when tacking. It is impossible to set any hard and fast rule for positions of the crew, as boats differ in their weights; the best way is for each man to try his boat, changing the crew at various intervals.

There is one thing, however, of great importance, that is, that everybody shall remain just as quiet and still as possible, as the least movement retards the sensitive racer's speed tremendously.

CHAPTER XXII

COMPASS COURSES

THERE is not a great deal to be said in regard to compass courses for small racing boats, as generally the races are sailed on inside courses and the marks can be seen when you have approached within a mile of them. It nevertheless is important to always carry a chart and compass, as it is impossible to tell when they might be of the greatest use to you in winning the race. If, for instance, you see a fog shutting in, get your direction by compass, and also the general direction of the wind, and if there are any marks between you and the turning buoy, pick them up one by one, using them as guide marks. This will insure your correct direction. Be careful in using a compass that there is no anchor or any amount of metal under the cockpit floor, as this will throw

your compass out of true. If you are going to windward, sail your boat by your watch, say five to ten minutes on one tack, and the same length of time on the other, making short hitches. Then you cannot be far out, no matter what happens.

If the wind is very light the tendency of many skippers sailing in a fog is to allow the boat to fall off and off, not having kept an eye on the compass and getting completely turned around by the fog. It is an excellent thing to have all courses laid out on the circular or chart with the compass directions written in, then there will be no delay in plotting them.

CHAPTER XXIII

TYPES OF SMALL RACING YACHTS IN AMERICA

USUALLY the type of the small racing yacht is directly dependent on the locality in which she is to be used. For instance, deep water allows either the keel or centerboard; shoals, bays, rivers, and lakes, especially of the smaller size, usually mean a shoal centerboard. In the eastern part of the country to-day the so-called knockabout, either keel or centerboard, but with many hundred pounds of lead placed outside for ballast, is the type most used. There are many restricted classes of this type — of from ten to forty boats, scattered along the coast. In the western part of the country, especially on large lakes, where for the last few years small racing fleets have grown with great rapidity, the low-sided, flat scow is used almost entirely. When the restrictions are

21-foot water line unrestricted racing scow, 50 feet over all, 1900 feet of sail in mainsail and jib. Built on steel truss. About the limit that this type can go and still hold together

Three hulled boat built on wire trusses on 21-foot water line with 2000 square feet of sail. She was impossible to handle in anything other than very light weather, having no ballast

special, the class built under these is named for them, but usually the class name is the type and water-line length. They are as follows:

15′ knockabouts
18′ "
21′ "
21′ raceabouts (600 sq. ft. sail)
22′ cabin class (Massachusetts Bay)
25′ knockabouts
25′ cabin class (Massachusetts Bay)
21′ " " (Great Lakes)
21′ Quincy Cup boats (unrestricted, except water-line length)
Seawanhaka Cup Class (International, about 27′ water-line)
18′ class scows (Western Lakes)
20′ " " (Western Lakes)
Special International Sonder Class
"Q" Class under universal rule, used only on the Atlantic seaboard, between New York and Boston.

There are, beside the above-named classes, many local classes not so well known, such as several one-design 30-foot classes of keel boats, etc.

CHAPTER XXIV

SALT *vs.* FRESH WATER

IT is necessary in practically all cases to use the water for sailing that is nearest your home, if of any magnitude, and be very thankful to have that, as there are many men very fond of sailing that for some reason or other can never take part in the sport.

The difference in conditions between salt and fresh is very great, and usually a very different type of boat is needed to compete successfully in either one. In the Western Lakes, Great Lakes, and St. Lawrence River, the wind is apt to blow very hard, and consequently kicks up a short choppy sea that is difficult to handle. It is also a very puffy wind and the most successful boats are usually sailed with low rigs in comparison to those used on salt water. The inland lakes and rivers are very apt to be shoal and a center-

board boat becomes a necessity for pleasure as well as racing. This is not true of the Great Lakes, as there is plenty of water almost everywhere, and the deep keel, salt water boat is used almost entirely. Power in the beam and ballast, either in the centerboard or keel boats, is of vast importance, because the winds that blow over the fresh waters in America are usually very strong. This is generally not so on the salt water, where a high rig and an easy moving hull are essential in the racing boat, the sea being long and rolling and the winds apt to be aloft. One advantage the fresh water sailors have over salt, especially in certain localities, is that by dipping a cup overboard you can quench your thirst, and the old salt saying of — "Water, water, everywhere, and not a drop to drink," does not stand. When seeing this done for the first few times it strikes the salt water man as very amusing.

I consider fresh water sailing in most cases, more difficult than salt, especially if you do

not know your course, as the currents and puffs of wind come from almost any direction, for no perceptible reason. You may be sailing along with a twelve-mile breeze, and without any warning a forty-mile-an-hour wind will spring up and blow for ten minutes or so, then drop to a very light air again, there being at all times a perfectly clear sky. The reason for this is, I suppose, the topographical lay of the surrounding country and the temperature of the water, it usually being very much warmer than the salt, on account of its shallowness. The salt water, on the other hand, usually has a steady wind blowing after ten o'clock in the morning. The early morning breeze is very variable; and as the morning advances and the land heats up, the sea breeze and prevailing wind for the day comes in. Undoubtedly the salt water has a freshness and life about it that the fresh water never seems to have, and this helps to make it very attractive. In my opinion fresh water sailing cannot compare with salt.

CHAPTER XXV

NECESSITY OF EXPERT JUDGES AND TIMERS

THE necessity of having for officials in yacht races the best possible men procurable cannot be too strongly impressed upon the racing yacht clubs. There are many cases in which a great deal has depended on one race, and for some reason or other the officials were either incapable or were making too much of an outing of the race, thus forgetting their first duties, which are to see that the rules under which the race is sailed are lived up to and that no boat is pocketed and beaten unfairly. This sort of thing does not happen among the best clubs, but if the smaller ones intend to give races, and they are allowed to count for a championship series, then the club should get men who are competent to run the race properly, and leave the other sort of fun out until

after it is over. The officials should not be "land lubbers" and "piazza yachtsmen," but men who have been through it themselves, being able to give the right direction to starting and finish lines; get the classes away properly and at right intervals, and generally understand what they are doing. This, I am sorry to say, is sometimes overlooked and causes a great deal of discontent among the competitors, the consequences being that the next year the races given by that club are a great fizzle, as few skippers care to sail under such conditions.

The officials should remember that they are there to run a race and help the boats as much as possible, not to irritate and be disagreeable to the skippers and crews.

There are many cases of this sort to-day that have meant the winning or losing of a championship on account of poor officials.

CHAPTER XXVI

INTERNATIONAL SMALL YACHT RACING

INTERNATIONAL small yacht racing should be encouraged in every way, as it is by far the most satisfactory race to win, on account of its international character.

Of course the America's Cup is the "Blue Ribbon" of the world, standing alone for the greatest speed in yachts not over ninety feet water-line. Second to the America's Cup is the Seawanhaka International Challenge Cup, donated by the Seawanhaka-Corinthian of New York, U. S. A., in 1894, for the purpose of bringing together in friendly competition yachts of small size representing the various countries. This Cup was successfully defended by a Canadian Club, the Royal St. Lawrence Y. C. of Dorval, Canada, for nine years, truly a remarkable performance, especially as it was challenged for by the greatest

small yacht racing clubs in America. It was finally won by the Manchester Y. C. of Manchester, Massachusetts, U. S. A., in 1905, in three straight races, the challenging yacht "Manchester" breaking all records for the course on Lake St. Louis, Canada, and sailing as fast as fifteen knots across the wind. This was a remarkable performance for a boat carrying only five hundred square feet of sail.

This class of Seawanhaka boats, so called, are the fastest boats in the world for the sail area. Thus the Seawanhaka Cup stands for the greatest speed in small boats.

Another International Challenge Cup is the Canada's Cup, raced for between America and Canada on the Great Lakes.

The restrictions under which these boats were built have been changed from year to year, and a sharp ended thirty-footer with a moderate rig has been the usual type.

In 1906 the first International small boat series of races for the Roosevelt Cup was sailed between Germany and America, off

The Eastern Yacht Club at Marblehead, Mass., home of the Sonder Class in America

German team in American waters in 1906

During one of the International races with Germany in 1906. The three American boats in the background leading

Marblehead, Massachusetts, U. S. A., and again in 1907 a series was sailed between the same countries off Kiel, Germany, for the Emperor William Cup, and still again in 1909 another series will be sailed between the representatives of the same countries off Marblehead for the President Taft Cup.

Another series is that with Spain, the first contest taking place at San Sebastian in 1907, and a return contest will be sailed at Marblehead in 1910.

CHAPTER XXVII

THE COST AND EXPENSE ACCOUNT OF THE RACING YACHTS

A PERSON cannot expect to race a yacht successfully unless he is willing to haul her out of water once a week for a polish, put on at least two new mainsails a season, and keep the boat in the best possible repair. To do this costs a good deal of money, but if one man does it, he has the advantage of the person who does not. Racing is expensive, and if a person goes into it he must see his way clear to do everything that is necessary. It costs somewhere between fifteen and thirty dollars to have a boat of the smaller class hauled out and potleaded. Then there are also incidental expenses, new running rigging, broken spars to replace, boat varnished, painted, or polished, etc.

A suit of the best seven ounce sails, 550

square feet, and with a No. 2 jib and spinnaker, covers, bags, stops, etc., costs between one hundred and forty and two hundred dollars, but this is figuring on the best procurable. A thirty-foot hollow mast costs forty dollars.

The first cost of a fully equipped raceabout is between $1400 and $2000, and an eighteen-foot knockabout, M. Y. R. A., costs between $850 and $1400. A fifteen-footer costs between $500 and $800, a Seawanhaka boat between $1000 and $2500, a twenty-one-foot cabin boat about $1800, a twenty-two-foot cabin boat about $2200, a Sonder Class boat $2000, and so on.

The first cost or contract price depends upon the builder you go to, and also the time of year you build, the early fall being the least expensive time, and the late spring the most costly, because every builder has a lot of work on hand in the spring. It is always better, if you have made up your mind to build, to get started early in the fall.

CHAPTER XXVIII

LAYING UP FOR THE WINTER SEASON

WHEN hauling your boat out in the fall for winter storage, decide on the yard you will go to, and then get a figure from the owners of the yard for hauling out, covering with canvas, or putting in a shed, and launching again in the spring. If you know when you haul out, what painting, rigging, etc., you will want done in the spring, get a figure for that also. Then, when you know about what it will cost you, add on about twenty per cent of your figure for incidentals, as the spring bill is always larger than expected.

When the boat is stripped, see that the spars are properly hung so they will not spring or warp; see that the sails are put away thoroughly dry in bags and placed where the mice cannot get at them. Have the rigging

neatly coiled and labeled, and any metal work well greased. Have an augur hole bored through the garboard streak in order to properly drain the hull. Have the boat put in the shade if possible, and if she is covered with canvas have it nailed down to her sides thoroughly. Do not close her up, but have all doors open inside and out, also hatches removed.

If the varnish and deck paint is well worn, it is an excellent scheme to have it touched up, as the craft is then better able to stand a hard winter.

Care in laying up means an easier job in the spring, and is a saving of money in the end.

CHAPTER XXIX

AMATEURS AND PROFESSIONALS

THE difference between an amateur and professional is that the amateur has not been paid for sailing or handling a boat, whereas the professional has.

Professionalism is the great ban to all sports, and in most instances it kills it, yacht racing as much as any other. I speak of the smaller classes. A boy under twenty years of age, with say three or four years' experience, does not want to race against a professional of say thirty-five, who has sailed for twenty years, and knows all about it. He may keep at it for awhile, but in the end, unless the amateur is a very good sailor, it will kill the sport.

A good amateur, however, is apt to be better than a good professional; for many

reasons he will do better, he has a better nerve, enjoys the sport keenly, and it also is a great feather in his cap if he wins against some good professional.

I think it is a step in the right direction when a club bars professionals from steering races in the small classes. Half the pleasure in racing is to race against a crowd of men you know and like, so you can talk it over with them afterwards.

The racing clubs should never allow an owner to turn his boat over to a man who is really a professional, but sails as an amateur with a paid crew, to race her for him, he staying ashore and his boat winning the championship. This sort of business is done, and should be stopped by the club giving the races.

CHAPTER XXX

THE MAGNITUDE OF RACING IN AMERICA

PERHAPS America, especially the United States, gives a greater chance for yacht racing than any other country in the world. With its irregular seacoast, studded with harbors, bays, and islands, it gives great shelter to the small yachts, also its Great Lakes and inland waters make it possible for the people in the interior of the country to have their clubs and races.

Its sailors have always held their own with the best in the world, and as proof of their superiority, the United States is custodian for all the International Cups of any note. Many people are apt to say, "Oh, they won because they sailed in their home waters." This is not true; they won because they have been brought up on and in the water, have worked hard to perfect and advance the sci-

ence, and to sail and handle their craft in a masterly way. That is the reason they have won and to-day stand above the world in racing yachts, propelled by the wind's force.

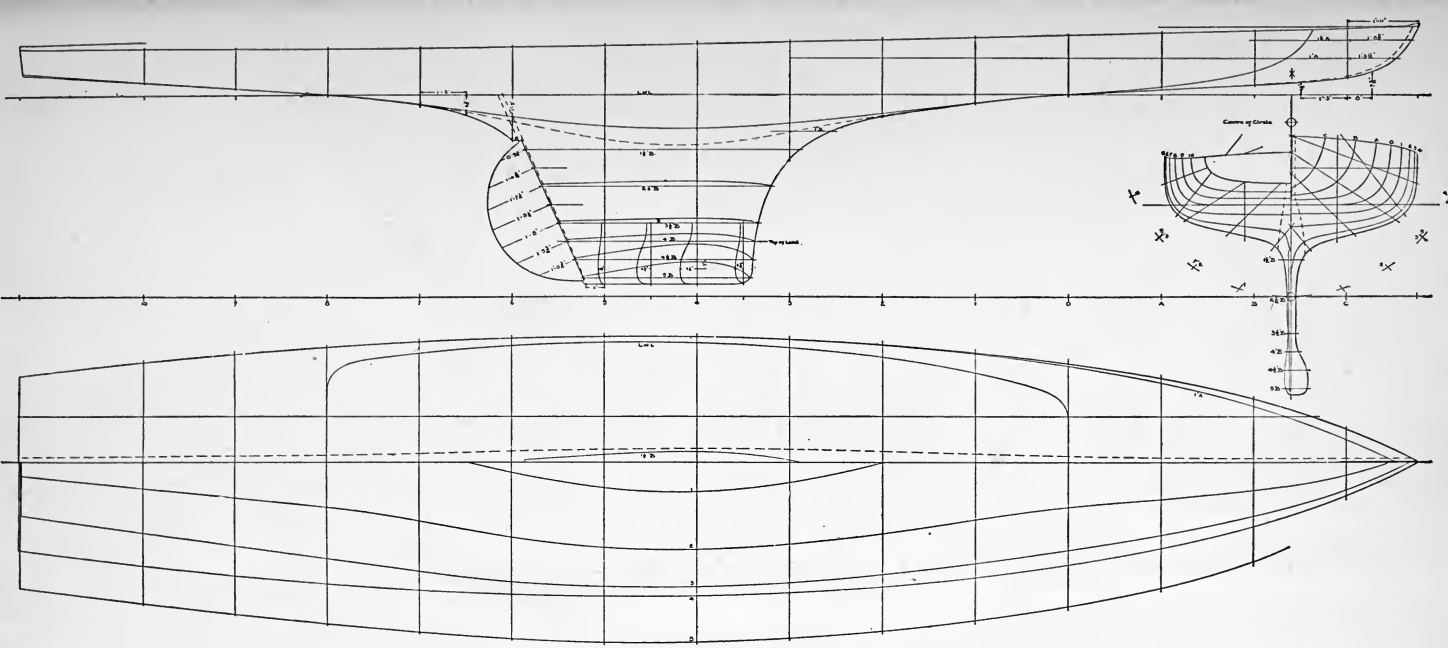
It has been a survival of the fittest, with the thousands of young Americans sailing and racing their little boats as boys, finally growing up to international fame as sailors.

America, or the United States, will always stand ahead, in my opinion, leading always by a greater margin than before, and will always be protected and represented by as fine sailors as the world will ever produce.

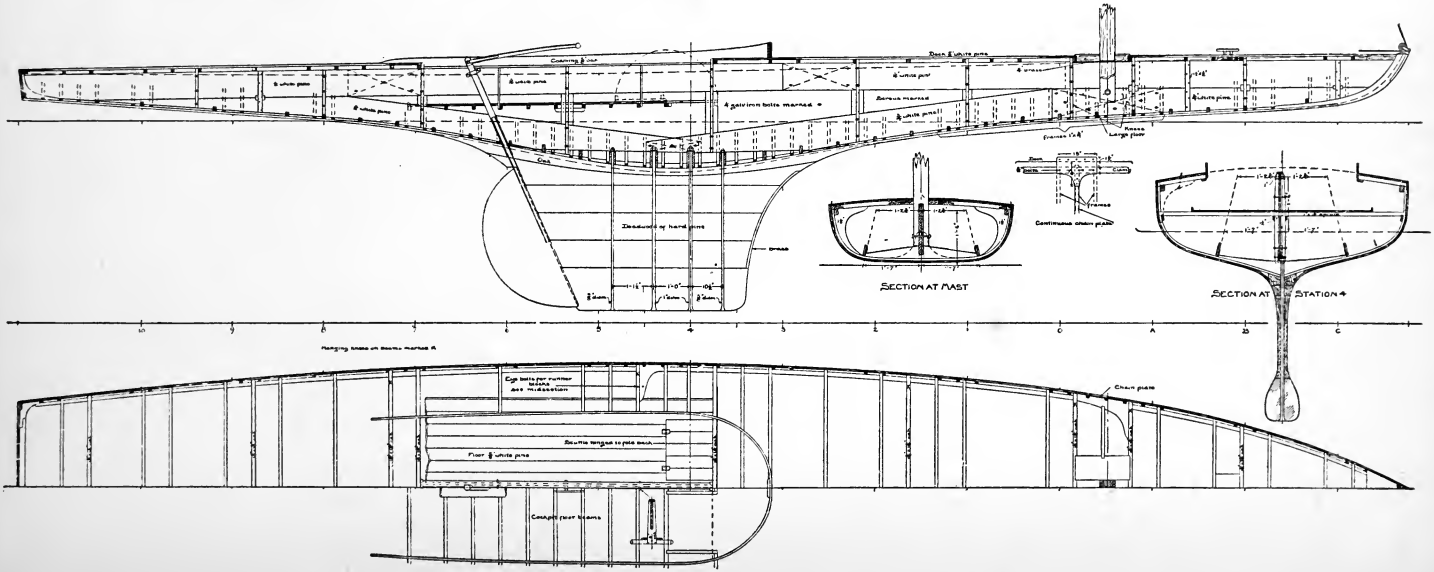
CHAPTER XXXI

THE INTERNATIONAL SONDER CLASS OF GERMANY, SPAIN, AND THE UNITED STATES

THE Sonder, or Special Class, as it is called, is for many reasons the most remarkable small racing class that we have, as, for the four years of its existence in this country, the critics, experts, and naval architects are still at a loss to decide upon the correct combination of measurements, weights, etc., that would go to make up the boat to win in all conditions of wind and water. In fact, from my own experience in the twelve boats I have designed, I believe it impossible to embody in one boat all the points that would make her successful under all conditions. It would take at least two, and possibly three, boats of entirely different design to cover every condition. This being the case, it is necessary to build the boat to sail



DESIGN 38*a*. Lines of Sonder boat, showing hard bilge, bulbed lead on fin, and long low-overhangs with heavy reverse curve in profile



DESIGN 38*b*. Construction plan of Sonder boat, showing heavy plank-on-edge trusswork bulbed lead, etc. Mast in position for catboat rig

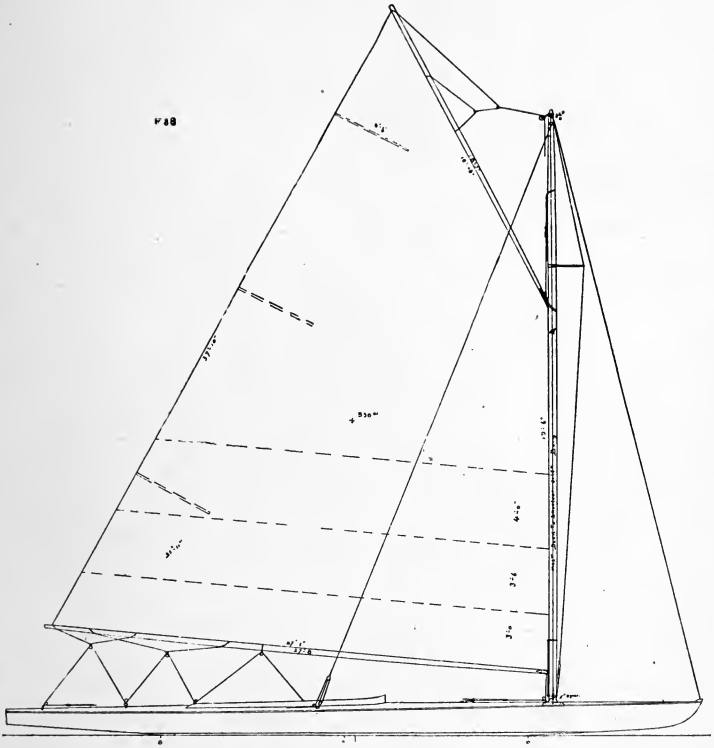
in the conditions of wind and water that prevail in that country where she is to be used. A good example of this is the fact that the German trio, in 1906, built for conditions that prevail at Kiel, Germany, met with defeat at the hands of the American boats off Marblehead. And in turn, in 1907, the American trio that went to Germany, being large flat boats with little ballast, lost to the German team of narrow, heavily ballasted boats, under extremely severe weather conditions off Kiel. I will go into particulars as regards these contests later on in this Chapter as I had the pleasure of sailing on one of the American boats in both series.

The class originated in Germany, the restrictions being drawn up there, and a great number of boats have been built, for, to begin with, there was a cost limit of only $1224, which now has been raised to $1440 in Germany and to $2400 in the United States. This allowed even the men of small means to own and sail a racing craft, and in order to

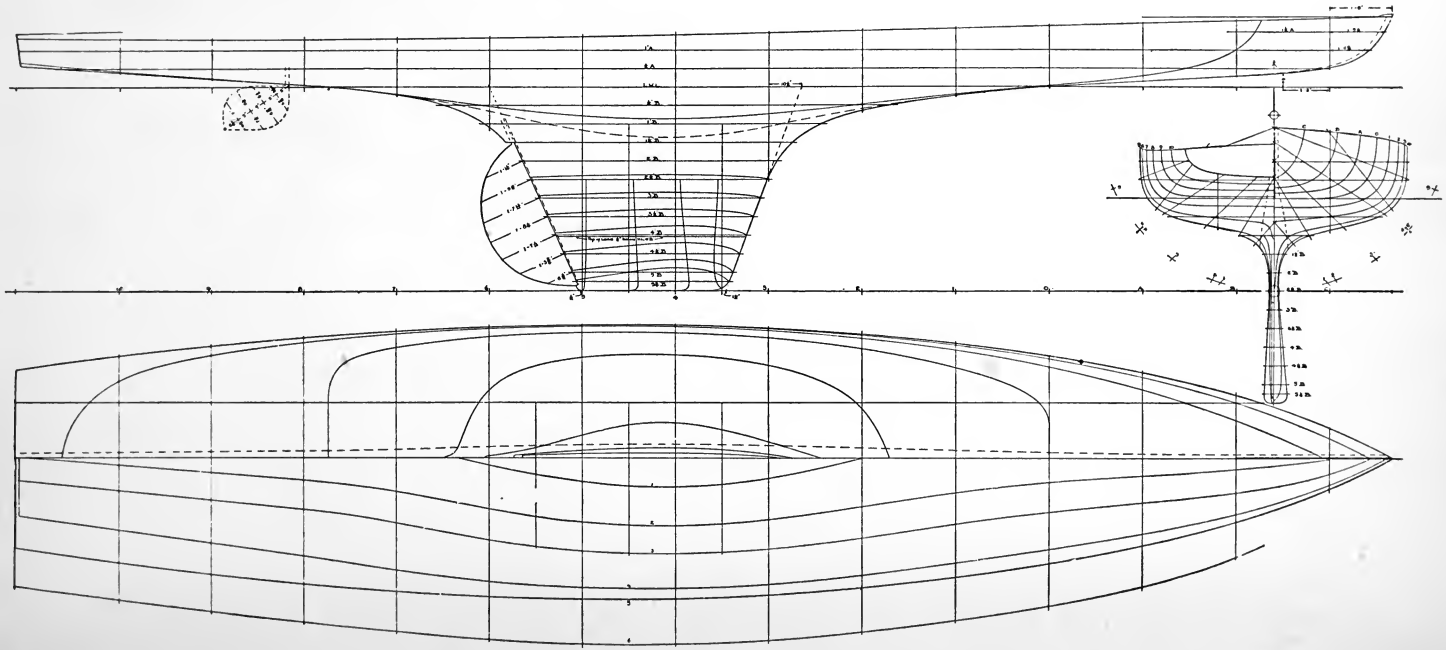
hold and increase the interest the Emperor of Germany offered valuable prizes to be sailed for each year during Kiel Week, and as many as twenty-five boats sometimes competed for them.

The first boat built in America was the "Uncle Sam," in 1902. She was shipped to Kiel where she succeeded in winning the Emperor's Gold Cup, after which she was purchased by his Majesty and given over to the Navy for the purpose of educating various officers in the handling of this small racing type. This boat is still in existence, which speaks well for the restrictions under which she was constructed.

In the summer of 1906 an arrangement was made between the Kaiserlicher Yacht Club of Kiel, Germany, and the Eastern Yacht Club of Marblehead, Massachusetts, for a series of races for the Roosevelt Cup, given by the Eastern Yacht Club, to be sailed off Marblehead in September. The teams were made up of three boats on a side — the first



DESIGN 38*c*. Sail plan for catboat rig on Sonder boat. 550 square feet in mainsail alone



DESIGN 37*a*. Lines of an easy formed scow Sonder boat, with round bilge

one winning three first places to take the Cup, and this series, is what gave the Class such impetus in this country.

There were seventeen boats built to compete in the trial races — the designs varying all the way from the wide flat scow to the narrow sharp-ended hull, with heavy lead. The general restrictions were that the length on the water-line, plus the greatest beam plus the greatest draft, should not be more than thirty-two feet. Also that the boat should not weigh less than 4035 pounds with equipment aboard, and that the sail area rated should not be more than 550 square feet in the mainsail and jib. The table of restrictions follows:

MEASUREMENT

L plus B plus D must not exceed 32 feet (9.75 meters).

L equals length on water-line
B " extreme beam
D " " draft

With complete outfit on board ready for racing, but without crew. There will be no time allowance.

Displacement

Displacement must not be less than 4035 pounds (1830 kilograms), without crew.

All yachts must be weighed.

Cost of Construction

The total cost of construction of the American yachts, including two suits of sails, must not exceed ten thousand marks ($2400).

Construction

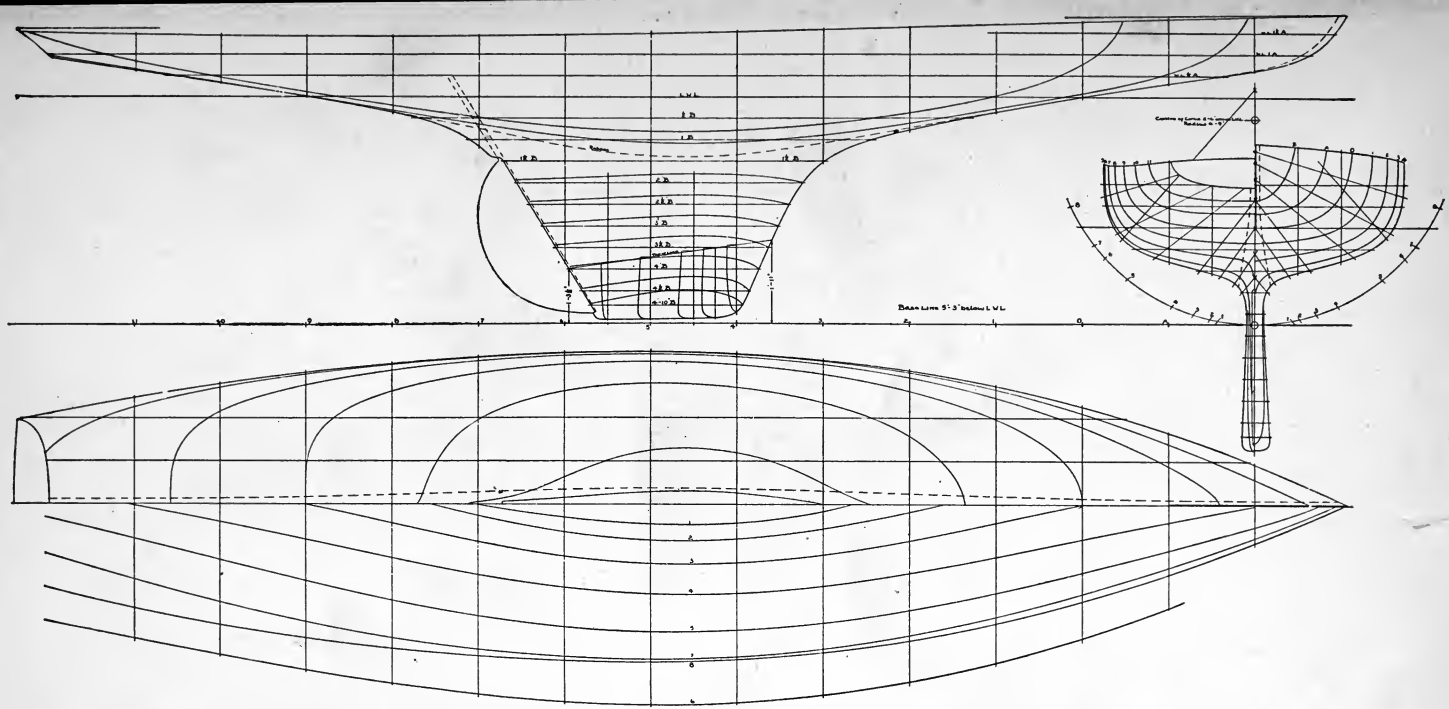
The hull must be built of cedar, mahogany, or heavier wood, copper fastened (this term includes brass or composition bolts and screws).

Double planking not allowed.

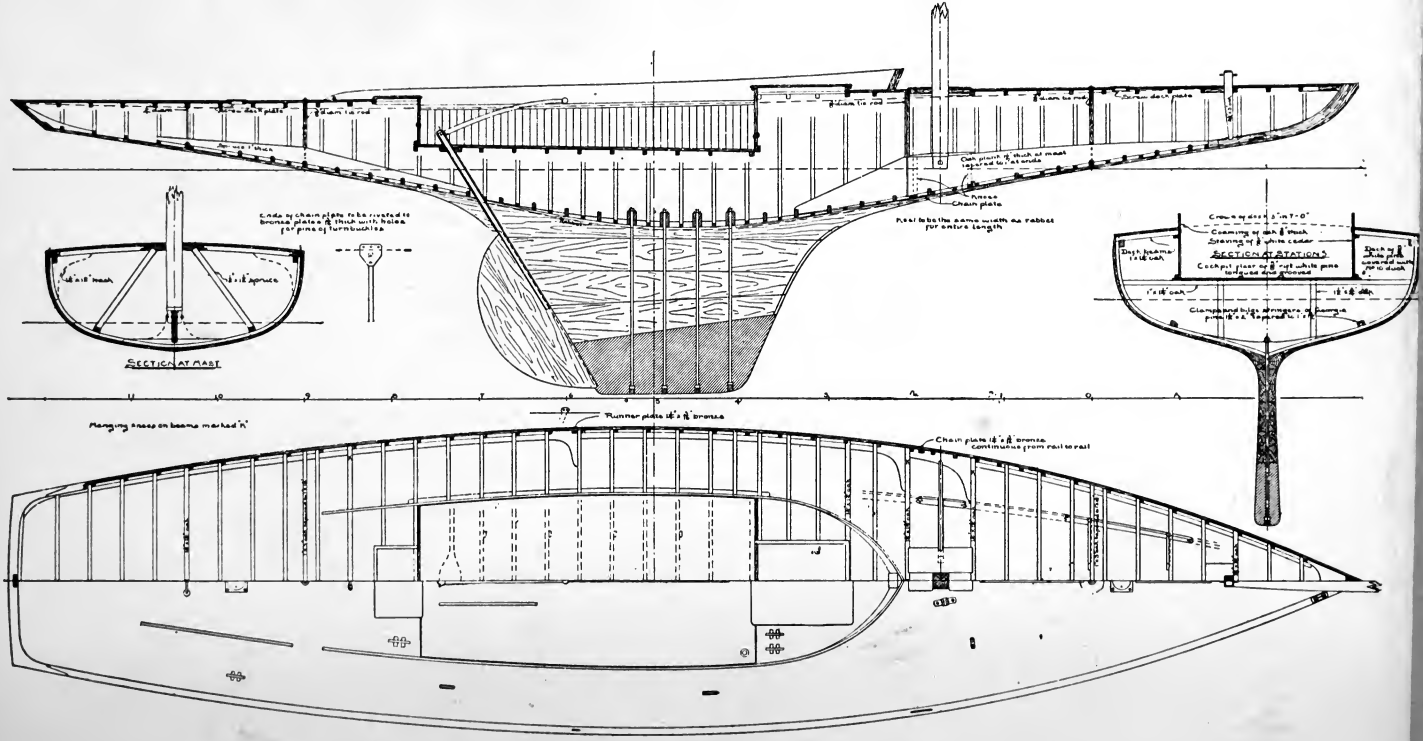
The deck may be pine or any other wood. Deck and planking must not be less than $\frac{5}{8}$ inches (16 millimeters) thick, no diagonal or ribband-carvel planking nor composite building and no centerboards or leeboards allowed. The cockpit must not exceed 8 feet (2.44 meters in length). The restriction on composite building does not prevent the use of a metal plate for a fin or of metals for interior trussing and bracing.

Rig

Rig optional. No hollow or built up or bamboo spars allowed. Sail area must not exceed 550 square



DESIGN 12*a*. Lines of an excellent type of Massachusetts Bay 18-footer, showing high ends with moderate formed, easy, round body, and good freeboard



DESIGN 12*b*. Construction plan of Massachusetts Bay 18-footer, showing plank-on-edge mast-step and simple construction

Fine ended Sonder Class boat. One of the American team in 1906 and winner of the Roosevelt Cup
A splendid type of small yacht

Sonder Class boat with cat rig. A fast rig to windward in smooth water but of no use in other conditions. 550 square feet of sail in the mainsail

feet (51 square meters), measured according to the rules of the International Yacht Racing Union. Yachts must carry at least one entire outfit of spars and at least one complete suit of sails on board during each race.

Certificate

Every yacht must produce an official measurer's certificate stating that she has been built in accordance with the above conditions, a fact which shall be ascertained by the race committee before the beginning of the races.

Crew

The crew must be made up of amateur members of the yacht clubs which are admitted to the trial races and shall consist of not more than three persons, who must be citizens of the country in which the yacht was built.

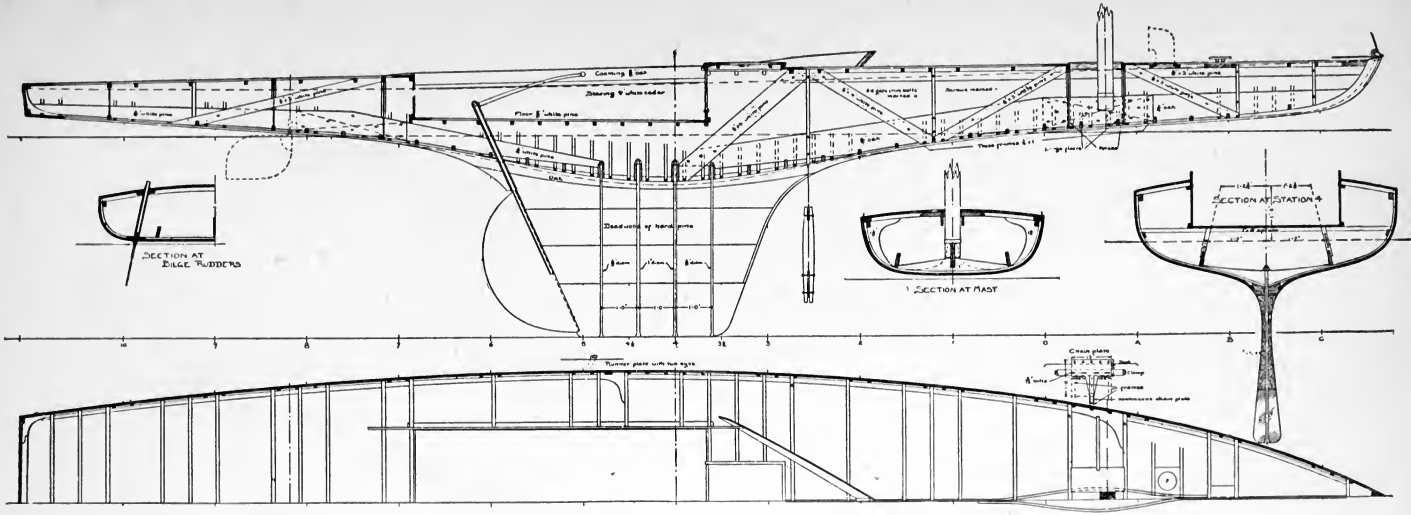
Conditions Governing the Races

The races will be sailed according to the rules of the International Yacht Racing Union, under the joint control of the Kaiserlicher Yacht Club and the Eastern Yacht Club.

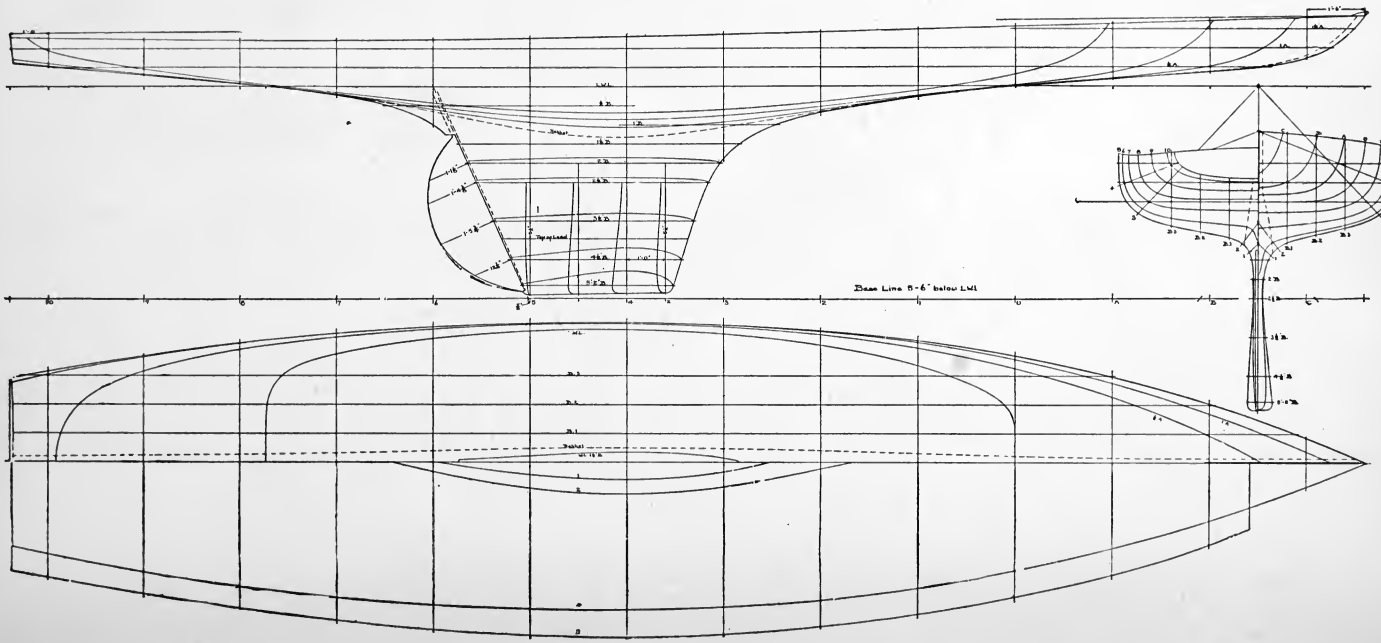
These restrictions mean that a boat could be any length over-all, and that you could use any combination of water-line, beam, and

draft, so that naturally a wide difference of dimensions and weights resulted. One of the boats that year weighed over 5000 pounds and others were down to the given 4035. One, as per plans No. 38, was of the long exaggerated overhang, narrow beam, hard bilged, flat shoal scow, and this boat was chosen to be one of the American Defenders. Another, of the same general type, only wider and deeper, with less bilge angle, and smoother lined, proved easily to be the fastest of the fleet in light, smooth weather; mainly, I think, on account of her very light ballast and wonderfully prepared surface. Her condition was as nearly perfect as it is possible to get, having a mahogany skin, highly polished by trained piano polishers. She was also chosen, and the lines are shown under plans No. 37.

The third boat on the team, and which eventually won the Roosevelt Cup, was of an entirely different type, being narrow with sharp ends, heavy displacement, and a compara-



DESIGN 37*b*. Construction plan of Sonder boat showing plainly the plank-on-edge construction



DESIGN 46. Lines of a broad, moderate ended Sonder boat, with slight reverse in the profile

tively large quantity of ballast—about 2500 pounds, as compared with 1700 on the scows.

This did not, however, deter the believers in the scow type from continuing to build them, for in 1907 two scows were chosen, with one sharp-ended boat, to go to Germany to represent America. In the races at Kiel, which took place that summer, severe conditions of wind and water were met with, and the German boats, with their low sails, small narrow hulls, and very heavy lead, or ballast, were easily victorious. The only American boat to make any showing was the one with the smallest hull and sharp ends. And here I might add that the sails were very much against the success of the Americans, as they were too full for such severe conditions. The German boats having flat sails had a tremendous advantage, as the wind attained a velocity of forty miles an hour during some of the heavy squalls. The full sails of the American boats were all aback, while the flat sails of the Germans were carried full most of the time.

Another surprising point was that on a broad reach in the heavy sea, the narrow, sharp boats carrying full sail were forced through the water at a greater speed than the scows with single reefs, which was all they could carry. Under a less weight of wind pressure the scow would outreach the smaller boat.

On leaving Germany my mind was made up that the little hull with plenty of lead was the type to win with in the Sonder Class, and I have not changed my mind to any great extent since, as far as Kiel conditions go, unless it be in favor of the big scow, weighing 4800 pounds, with 2600 pounds of lead. This type has not been thoroughly tried out, although she is considered by many to be the correct idea. She would, however, be absolutely useless in other than very heavy conditions, and so it would be a difficult matter to get her selected during trial races, especially at Marblehead. In 1908 only one powerful boat was built in this country, the plans being shown in design 41.

She was very narrow, heavy displacement, excessive draft, and she proved to be the best of the American boats during that summer in a strong breeze and sea, going to windward in a remarkable manner, but slow reaching and running before the wind.

On the other hand, in 1908, the races showed the sharp-ended boats to be of little value in conditions at Marblehead, as the only boats to win in the Class were two extreme scows with light ballast and the boat last mentioned. The winner of 1906 and her sister boat did not get a first place.

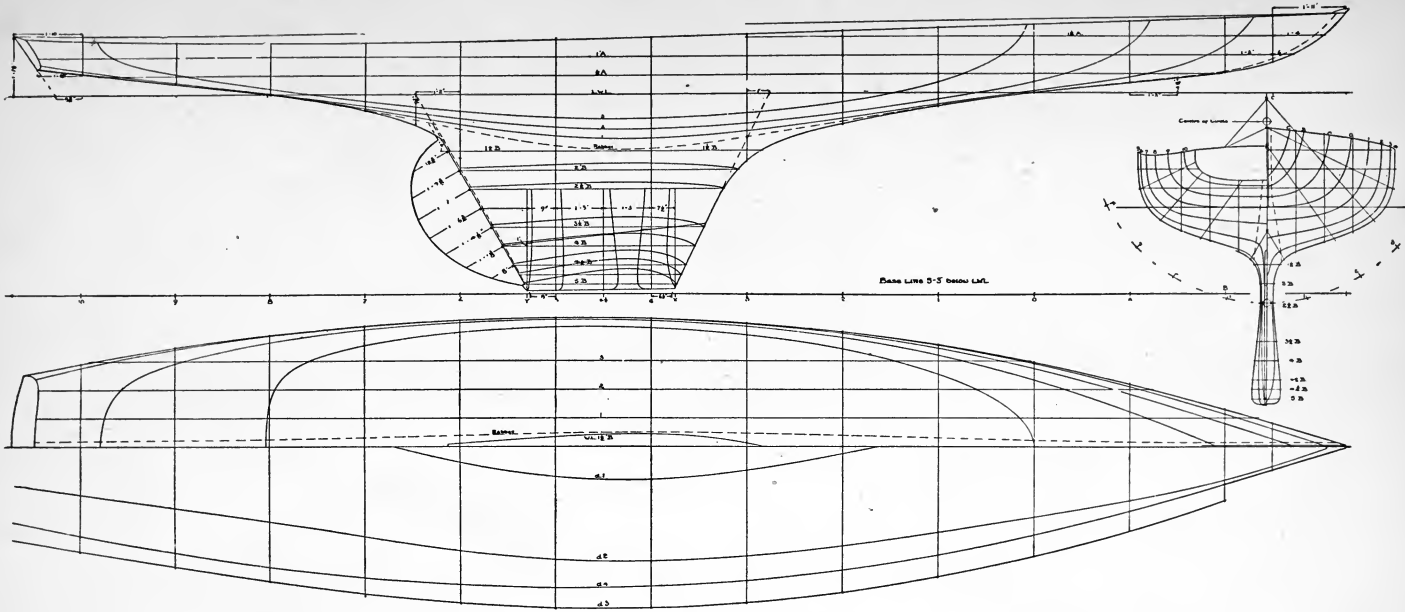
The outcome of the 1908 races again set yachtsmen thinking as to what really was the correct type, and as yet this question has not been answered. The tendency, however, is to the broad flat boat for the 1909 trial races.

Designs 46 and 51 show the modified wide scow with reverse overhangs and low ends; also the refined narrow scow with less reverse; generally a compromise in an attempt

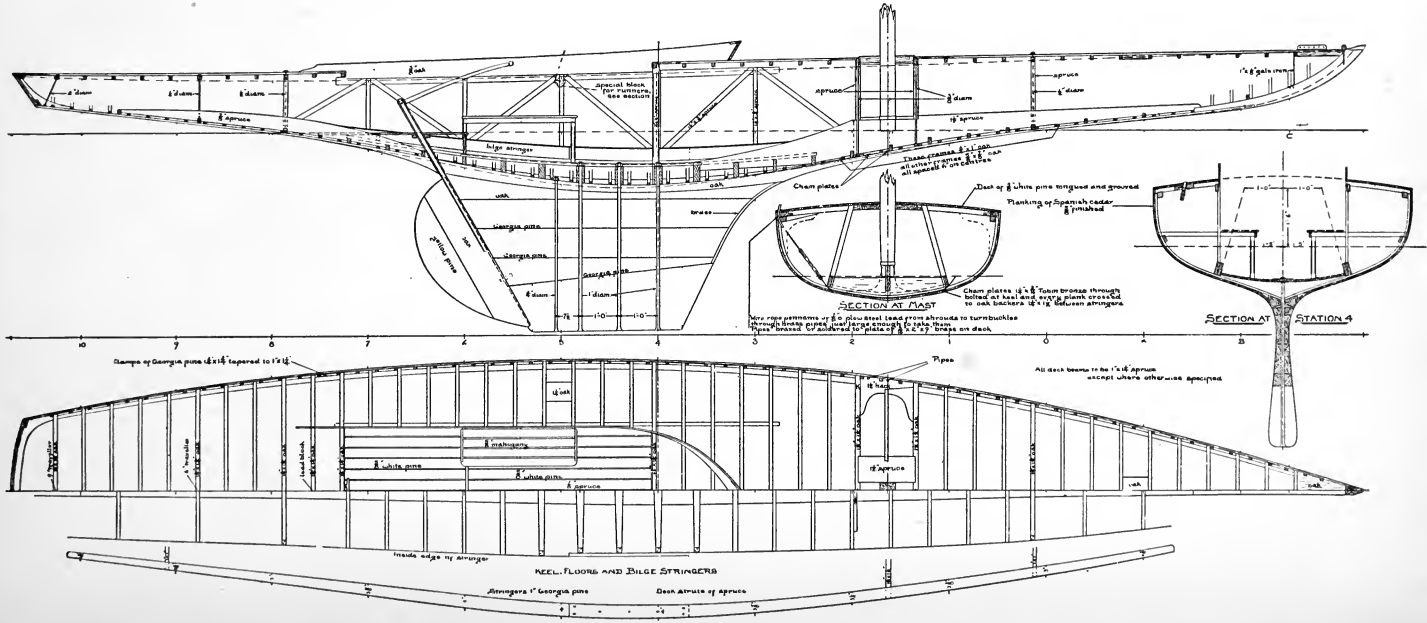
to get a good average boat. These boats are being built for the 1909 races.

Having, in a general way, covered the German and American types I shall say a few words about the Spanish Class that again puzzles the minds of the various designers.

The American team of the year 1907, after leaving Germany, went to Bilbao and San Sebastian, Spain, for a series of races with the Spanish boats. The outcome of this series was a victory for Spain and the winner was an exceedingly narrow, sharp-ended boat with a heavy dead rise on the sections. The races at San Sebastian were drifting matches with an old ground swell rolling in from the Bay of Biscay. As I mentioned earlier in this book the sharp boats easily outdrifted the flat ones, especially in a rolling sea, again showing that the narrow, sharp-section boats were better in a slight roll, with no wind, although apparently fluky winds had something to do with the races being very unsatisfactory as a test of speed.



DESIGN 42*a*. Lines of Sonder boat with round, easy body, high ends, shoal draft, and small beam



DESIGN 42*b*. Construction plan of Sonder boat, a type well suited to severe conditions

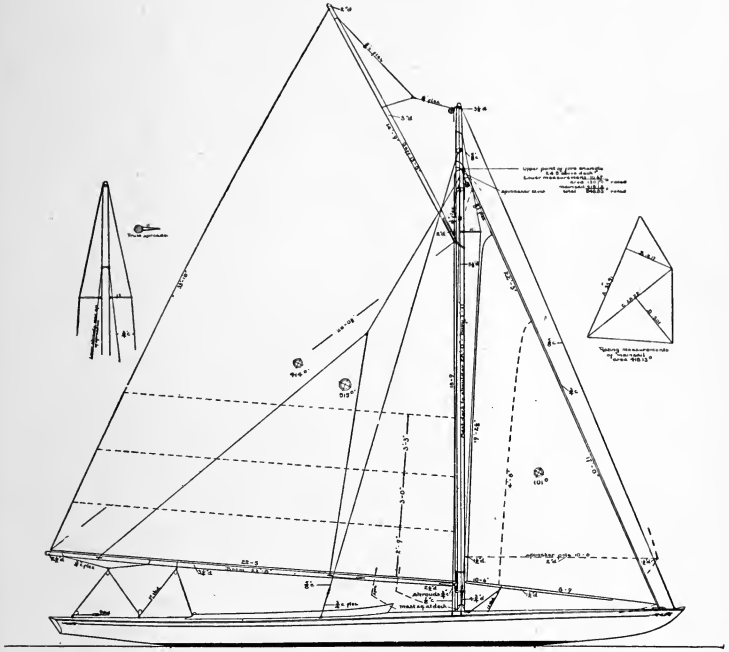
The following plan shows a sharp boat with a round, easy form, a boat that should be well adapted to foreign conditions, either in a light or heavy wind. (See design No. 42.)

Now, having given in a general way what this Sonder Class has actually done, I will say something as regards the makeup of the different types, the American boats having shown a great diversity in design.

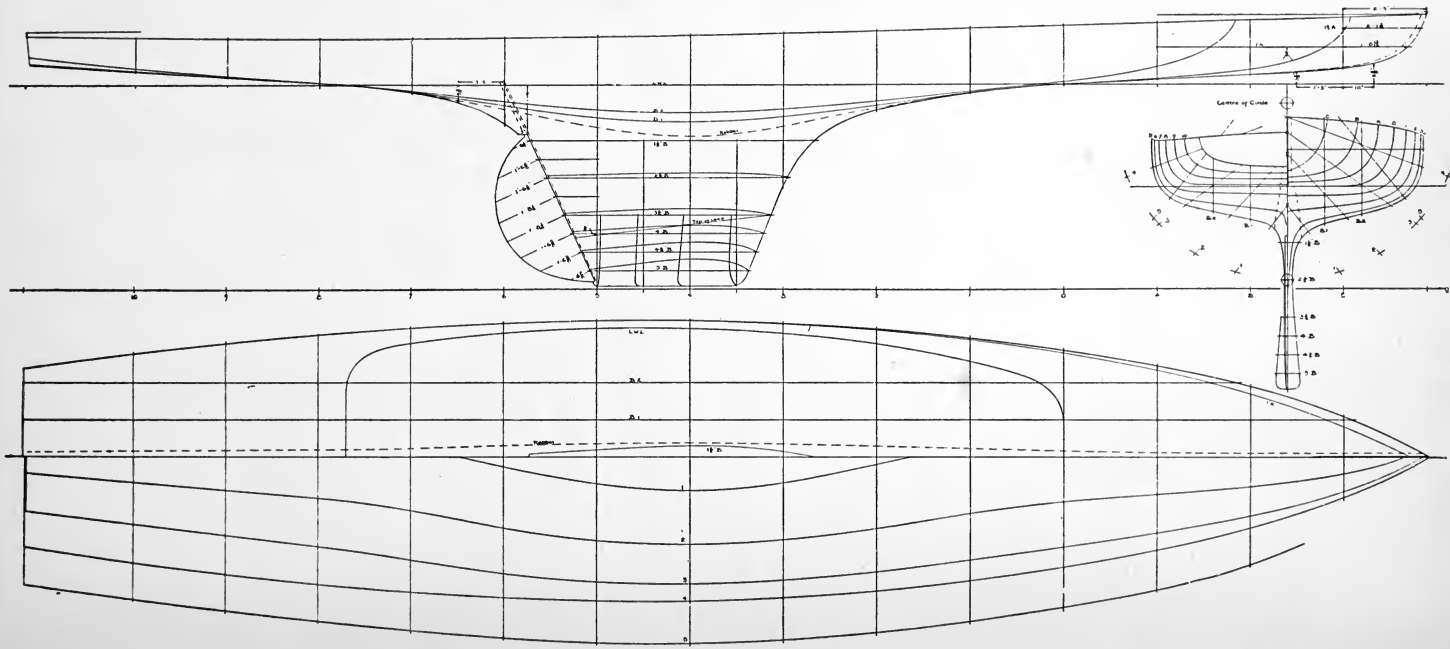
From a first glance at the Sonder Class requirements, it would seem that the boat should be rigged as a cat boat, because the sail rating is the actual sail area of the mainsail plus the area of the fore triangle. This fore triangle has for a base line the intersection of the headstay with the deck and the fore side of the mast; and for a perpendicular, the intersection of the jib luff and the mast, or actually the highest jib halliard or spinnaker block. These areas added together must not be more than 550 square feet of area. This means that there will be a certain amount of area lost in the actual jib, as it would be im-

possible to completely fill the fore triangle with the jib. So it works out that there are actually about 525 square feet in the working sails, if the boat is rigged with mainsail and jib. This being so, I decided to try cat rigs on my boats in 1906, and planned the hulls accordingly.

Two of the boats that year were worked out under that rig with a great deal of care, but in the end were adjudged failures and their rig changed to jib and mainsails. One reason for this was that it was necessary to have the mast stepped well out on the forward overhang, thus making it very difficult to hold the mast in place. Another reason was that the weight of the mast gaff, etc., being well forward, spoiled a sensitive hull and would not allow of free action, that is, the rise and fall of the hull in a seaway, which killed her life. The boats instantly showed more speed on being shifted back to the other rig, and one of them was later the first choice on the American team. The other steadily improved, until in



DESIGN 42*c*. Sail plan of Sonder boat, showing long base to fore-triangle



DESIGN 40. Lines of a very broad, lightly ballasted Sonder boat, showing immense overhangs

the summer of 1908, with a somewhat different balanced rig, she proved to be by far the fastest boat of the fleet in light weather. The lines are shown below (number 40), and her dimensions are 38 feet over-all; 19 feet 3 inches water-line; 5 feet 5 inches draft; and 7 feet 4 inches beam, with very low flat ends and weighing 4090 pounds. I am pleased to say that she was sailed by the youngest amateur in the fleet, he having had but three years' experience and he sailed against some of the best amateurs in the country.

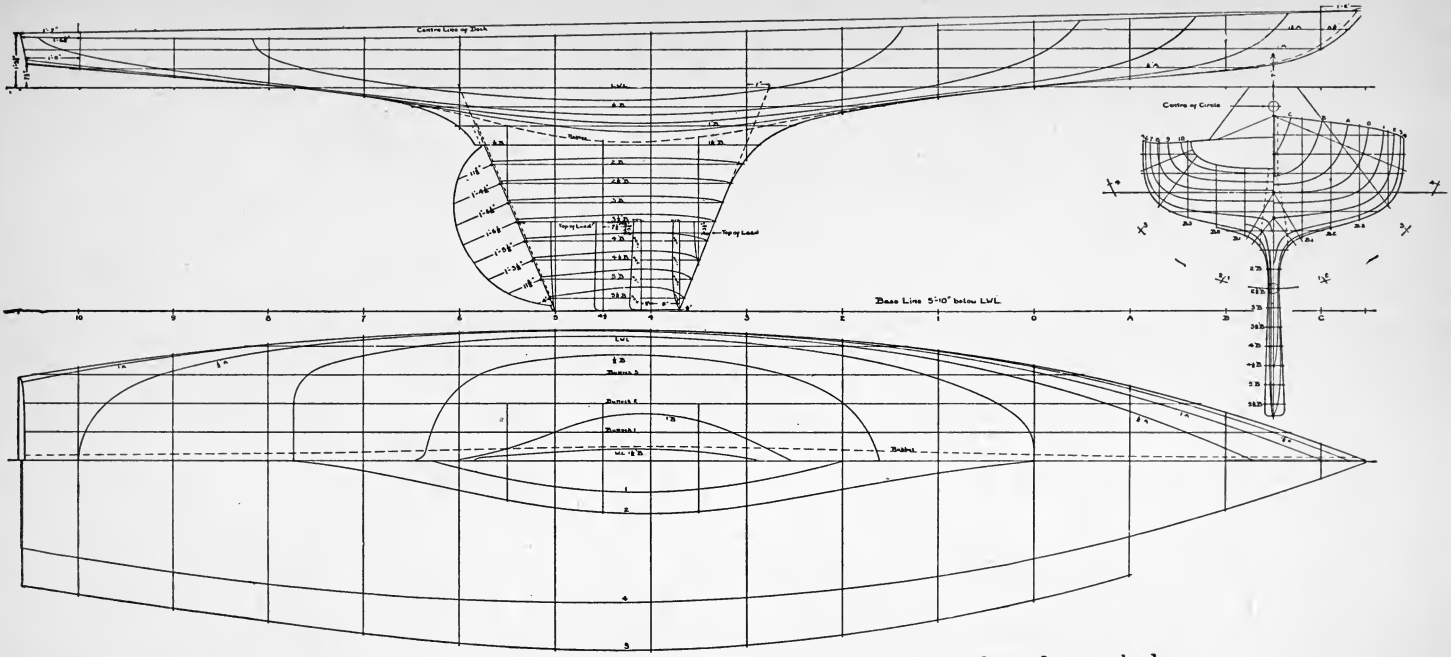
The boat that proved to be the best all-round boat in 1906 was a moderate formed, round, easy-lined, healthy type of little racer of the following dimensions: 35 feet 6 inches over-all, 19 feet 9 inches water-line, 6 feet 8 inches beam, 5 feet draft.

With a low rig and heavy ballast the entire craft weighed about 4500 pounds, and depending on her lead for her stability she was a good all-round boat. She used very flat English cut sails, setting to a

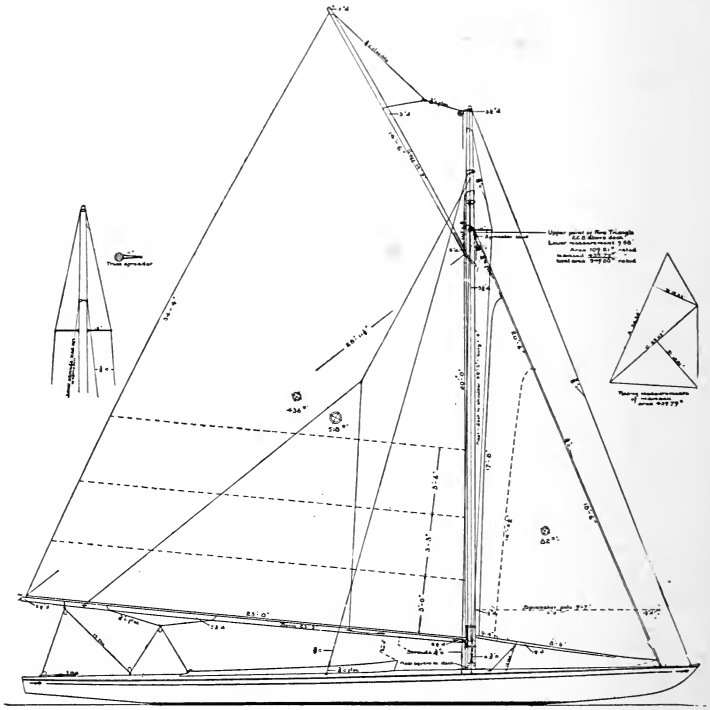
nicety, and her painted hull was beautifully smoothed.

In 1907 there were comparatively few boats in the Trial Races for the selection of the team to go to Germany, and a sister boat of the "Champion" in 1906 was badly defeated. Two light weather scows and a 1906 boat were finally selected, none of which were first class in any way, though the best obtainable at the time.

In 1908 one new boat was built on the following plans: Her dimensions were 35 feet over-all; 19 feet 3 inches water-line; 6 feet 10 inches beam; and 5 feet 10 inches draft, an excessive draft for these little boats, as proved by the season's racing, the deep fin seeming to be a drag in any conditions, excepting a heavy blow to windward when she seemed at home. Under these conditions nothing could beat her, as she would hold on and go up across any bow in the fleet with apparently little effort, but she was slow across wind, or before it. She had a long,



DESIGN 41*a*. Lines of a very deep Sonder Class boat with moderate formed upper body



DESIGN 41*b*. Sail plan of jib and mainsail rig for Sonder boat
Showing large mainsail and small jib

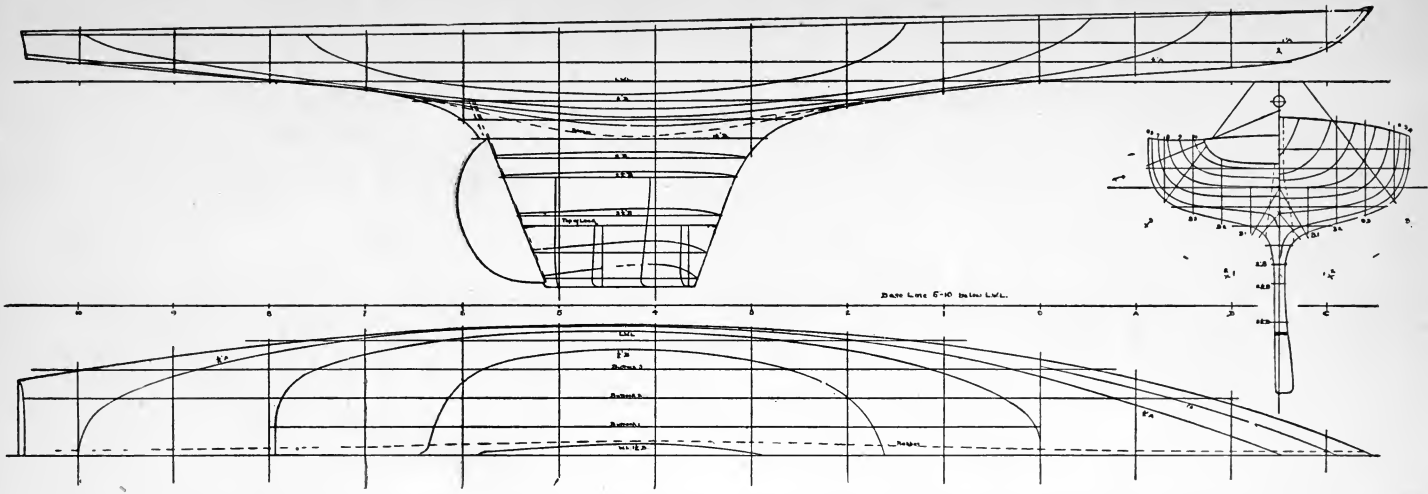
easy bow, especially adapted for a seaway, and her weight of 4450 pounds made her powerful, and although the center of gravity of the ballast was high up the combination was good for a breeze. (See design 41 *a*.)

Another boat in the 1908 fleet was the crack of 1906, but either the other boats had improved or she was not in as good condition, for she was usually beaten by from one to three boats in the races which she entered. And so again the balance of favor for the new boats of 1909 was toward the developed scow form, less brutal perhaps than the old scows, but of the scow type. Designs 46 and 51 for 1909 show the modifications:

Most of the American boats are equipped with fairly full sails — that is, sails with considerable draft or flow in them, as these seem to give the best results in our ordinary midsummer conditions. In the early spring and fall, however, hard flat sails are essential, as was proven last year (1908), when one of the large scows, that had won practically noth-

ing up to that time, came out with a flat suit and easily defeated the fleet in three heavy blows, winning thereby the Quincy Challenge Cup, raced for now by the Sonder Class. This win was accomplished mainly by the fact that she was able to point very high and still hold her headway, even though the hull was not especially good under the conditions. It is fair to add that the boat was almost perfectly handled by one of the finest amateurs in the country.

The balance of these boats is almost as necessary as a good hull and helmsman, as they balance on a narrow fin, are long overall, with the rig well inboard, and turn in a very short radius. Of course, in light weather the helm will be carried amidships, or possibly a little lee helm is felt in very light drifts, but the minute the boat feels any wind pressure the helm should be in the center line, or slightly to weather. Then when it blows hard, the balance in a measure should remain about the same, anyway to windward.



DESIGN 51. Lines of the easy formed, round bodied Sonder boat, showing moderation in each dimension

It is in reaching that the boat will gripe, then being very hard on her helm, and to offset this trouble, trim the jib more or less flat and ease off the mainsail slightly and she will at once show better speed.

The rig on several of the boats, such as halliards, main, and preventer backstays, lead below deck, thus offering less windage and making things more trim and snug. This, however, is carrying things pretty far unless the owner or skipper understands this sort of rigging pretty thoroughly. Wire rigging is quite generally used and all the halliards have tackles so that the sails may be set up during a race if necessary. In most of the boats the cockpit is amidships, thus bringing the crew over the center of buoyancy where they should be allowed to sit well down in the bottom, as practically none of the boats now use water-tight cockpits, some going so far as to leave out bottom boards or slats entirely, the crew sitting or standing, as the case may be, directly on the inside of the planks and floors. This

is done to save weight, as the bottom of the fin is the place for all ballast in these racing machines.

As regards structural strains, etc., I have found the best method, and in fact the only one to stand the strain of three years' racing, to be three sets of longitudinal trusses placed between deck and bottom, this only applying to the extreme flat-ended scow, as she is necessarily hard on herself in a seaway, and if the ends drop any the boat will go badly over length. She is only one foot and a few inches from deck to bottom for the greater part of her hull; has 2000 or more pounds of lead hung in the middle; and with the low flat ends the pounding in a seaway is very severe, so it is necessary to thoroughly brace her. Plank on edge trusses, with lattice work and uprights, tie rods, etc., are very essential for this form, and it has always seemed to me to be the most satisfactory bracing, as well as the lightest. These trusses are shown on the construction plans very clearly.

I think that the best combination of rig is about 425 square feet in the mainsail and 100 square feet in the jib; this, with the short base to the fore triangle allows of a good height for the spinnaker block, which greatly benefits the effectiveness of the spinnaker, as was proven by one of the boats in 1908, when her change in rig put her from a medium good boat to the best in the class, to my mind. This was due almost entirely to the raising of the spinnaker block clear of the mainsail, so giving the spinnaker head a chance to do good execution. It was not bothered in any way by the mainsail, so I have adopted this plan for the six boats I have designed for the summer of 1909.

I looked over the German boats very carefully in 1907 and they certainly have a great advantage in construction over anything that I have yet seen built in this country. The Spanish cedar used by them has been drying out for years and many of them were built with flush seams, having no calking what-

soever. This insured a good surface under any conditions, as there was no putty to squeeze out; also, instead of using rivets with bungs, of which there are about 4000 in one of our boats, they use small brass or copper nails, small headed, and flush with the outer surface. The skin was varnished above the water; with paint or potlead below the surface, and was polished to a high point of perfection. Their planking is very light, and on account of the small sharp-ended hulls they require very little interior bracing. These facts allow them to carry a very large percentage of lead to total weight, about 60 per cent, which means about 2600 pounds of ballast — a very great advantage. They were also fairly heavy; weighing 4300 to 4600 pounds — another advantage in their weather conditions, and so they were able to lug their rigs far longer than the American boats.

Their dimensions were very moderate — about 33 to 36 over-all, 4 feet 8 inches draft and 6 feet 6 inches beam, allowing thereby a

long water-line of about 21 feet. They had very easy formed high ends, the angle of rise being twice as much as that of the Americans. There were no reverse curves in the profiles, but the overhangs ran straight from the middle body. Their sections were very round, with a heavy dead rise, and forward the sections worked into a "U" shape, while the stern transoms were narrow and the lines on the whole exceptionally graceful, depending on the ballast for stability, having practically no initial stability in the hull.

The sails used in 1907 were a great improvement on those used over here in 1906, being well-cut and of good proportions, but of fairly heavy duck and very flat (little draft). They used roller booms for reefing, which are necessary under German weather conditions, as it will sometimes come up and blow thirty or forty miles an hour without any warning, and to be able to reef quickly is a distinct advantage. In one race it was necessary for us, on the boat I was sailing on, to

lower our peak, ease the mainsail well off, and reach across the wind for ten or fifteen minutes, while the German boats rolled in a reef and went about their business, gaining many precious minutes in the operation.

As before said, the German craft of 1907 were the finest constructed boats of this class I have as yet seen. There is tremendous interest in this Sonder Class, mainly on account of its international character, and as nearly as I can estimate there have been built, and now exist in the three countries, including the 1909 boats, between 90 and 100 of this class, at a total cost of close to $150,000, which, if incidentals are considered, would bring the cost up to $200,000. Quite a sum for a small class.

It may be of interest as showing the friendly feeling that exists between Germany and the United States, that after the races in 1906 the architects of the American team forwarded their plans to Germany, to be published and used by anyone who might be interested, and

to help along the sport. In return the Crown Prince of Germany in 1907 sent me a set of plans of his boat "Angela IV" for use over here. I know of no other international sport where such an open-handed policy prevails.

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